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THE EFFECTS OF STRESSORS IN THE WORK ENVIRONMENT ON FACULTY PRODUCTIVITY IN ACADEMIC YEAR 1980-81

By

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ABSTRACT

THE EFFECTS OF STRESSORS IN THE WORK ENVIRONMENT
ON FACULTY PRODUCTIVITY IN ACADEMIC YEAR 1980-81

By

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This study was designed to measure the consequences of a proposed reduction in force on faculty productivity. For the purposes of this research, faculty productivity was defined as journal articles (refereed and nonrefereed) completed and submitted for publication in academic year 1980-81, books completed in academic year 1980-81, and research proposals submitted in academic year 1980-81.

The hypothesis examined was that there is a negative relationship between faculty productivity and stressors in the work environment of the magnitude of the threat of job loss. Consequently it was predicted that faculty productivity declined in academic year 1980-81 as compared with 1979-80. In addition, it was predicted that this stressor would have a differential effect depending on the amount of objective change faced by faculty, on the amount of control over the stressor perceived by faculty and on the amount of social support at the disposal of faculty.

The results of this research indicate the following:

1. Stress has an adverse effect on productivity; as stress increases, productivity decreases. Further, the relationship between

stress and productivity is linear rather than following the pattern of the inverted U-shaped function found in experimental studies of the effects of arousal on performance.

2. Neither the "events" approach nor the "cognitive" approach is sufficient alone to explain the effects of stress on productivity; this study indicates that both the individual and the situation must be considered when looking at stress effects.

3. Social support may have a direct relationship to increased productivity.

4. A sense of control may be directly related to diminished productivity.

5. When variables measuring social-support resources and feelings of being locked-in were examined as stress predictors, it was found that the perception of being unable to move from a current job to another one at MSU exacerbated stress.

6. The results for both social support and sense of control only relate to the direct effect of these variables on productivity; their indirect or moderating effects, in the presence of stress, require the use of path analysis as an analytic technique.

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My thanks to my daughters, Leanora and Maya, who, at some sacrifice, patiently and with love bore with me during the research and writing of this dissertation.

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CHAPTER I

INTRODUCTION

Statement of Purpose

Stress-inducing stimuli or stressors are characterized as new, intense, rapidly changing, sudden or unexpected, and approaching the upper thresholds of tolerability.[1] Faculty at Michigan State University experienced unprecedented work-related stress-inducing stimuli in the academic year 1980-81. The stressor, the specific stimulus, was the Board of Trustees' announcement that approximately 100 tenured and tenure-stream faculty were going to be laid off because of financial crisis.

A stress state or stress is defined as a "state within a living creature" that results from the interaction of the organism with stressors, i.e., noxious stimuli or circumstances.[2] The stress state has physiological, emotional, and behavioral components. Physiological components refer to changes in the body; emotional components refer to changes in perception, feelings, and behavior. Strain is characterized as any bodily response in excess of normal or

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[1]Mortimer H. Appley and Richard Trumbull, "On the Concept of Psychological Stress," in Stress and Coping: An Anthology, ed. Alan Monat and Richard S. Lazarus (New York: Columbia University Press, 1977), p. 58.

[2]John Cassel, "The Contribution of the Social Environment to Host Resistance," American Journal of Epidemiology 104 (1976): 109.

usual states of anxiety, tension, and upset or any behavior that deviates momentarily or over time from normative value for the person or the appropriate reference group.[1]

The researcher's purpose is to measure one specific faculty response to a stressor: behavioral change as it relates to productivity. Productivity is defined as journal articles completed and submitted for publication in academic year 1980-81, books completed in academic year 1980-81, and grant research proposals submitted in academic year 1980-81. The hypothesis to be examined in this research is that faculty productivity declined in the academic year 1980-81 as compared with the academic year 1979-80 and that there is a negative relationship between productivity and stressors in the work environment.

Significance of the Study

The American Association for Higher Education reported in 1979 that a combination of demographic changes, judicial decisions, shifts in the college curriculum, and financial restraint in the allocation of resources for higher education suggest that the traditional understanding of tenure systems in higher education may change. In future periods of declining enrollments and financial restraint, tenured faculty will be terminated.[2] In the Social Readjustment Rating Scale developed by Holmes and Rahe, being fired from a job is eighth in

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[1]Appley and Trumbull, op. cit., p. 59.

[2]Thomas J. Linney, Alternatives to Tenure (Washington, D.C.: American Association for Higher Education, 1979), pp. 1-131.

in a scale of 43 stressful life events requiring readjustment.[1] Much research has already been done on the physical and psychological consequences of stress; less on the relationship between stress and productivity. Given the fact that layoffs of faculty are likely to occur in higher education in the next 20 years, it is important to assess the consequences of this event in terms of its effects on faculty output. Thus, this research is significant in that it investigates one outcome of an event that is predicted to become more common in higher education.[2]

The research is also significant in that it may suggest some intervention techniques that can moderate stress when job layoffs are anticipated. The mediating effects on stress of social support and occupational locking-in, the ongoing feeling an individual has when he or she thinks there is almost no opportunity to move from the current job to another one elsewhere or when the only position for which he or she is qualified is the job currently held,[3] will be examined in this research.

Finally, this research is significant in that it may provide additional knowledge to the field of stress.

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[1]Richard R. Bootzin, Abnormal Psychology (New York: Random House, 1980), p. 196.

[2]Linney, op. cit.

[3]Ronald J. Burke, "Occupational Locking-In: Some Empirical Findings" (paper presented at the Annual Meeting of the Western Psychological Association, San Diego, California, April 5-8, 1979).

Background

Hans Selye and Walter Cannon are names associated with early work on stress. Both were primarily concerned with the physiological consequences of stress. Selye attempted to demonstrate how physical and psychological stressors may lead to diseases of adaptation via a series of nonspecific biological responses called the General Adaptation Syndrome (GAS). The GAS is the defensive physiological reaction of the organism that is set in motion by any demand or stimulus. Its characteristic pattern includes three stages: an alarm reaction, a state of resistance, and a state of exhaustion. According to Selye, this sequence is invariant, although it need not be carried to completion if the stressor is terminated early enough. If the stressor persists or is severe, diseases of adaptation (for example, stomach ulcers or increased susceptibility to infection) will occur.[1]

Walter Cannon showed that physiological disturbance throughout the organism is associated with fear and rage. When these emotions are aroused, they bring into action the sympathetico-adrenal division of the nervous system, which controls internal organs and the blood vessels. The sympathetic division acts to maintain relative homeostasis in the flow of blood and lymph. When the individual experiences the emotions of rage and fear, the sympathetic division stimulates various reactions in the body: release of sugar from the liver, accelerated heart beat, contraction of the blood vessels, discharge of adrenalin, and dilation of the bronchioles. All these

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[1]Hans Selye, The Stress of Life (New York: McGraw-Hill Book Company, 1956), pp. 38-56.

changes mobilize the organism for action and make it more efficient. However, if this state of extreme disturbance continues for too long, if it is not "naturally eliminated by completion of the emotional response," a fatal result can occur.[1]

Both Selye and Harold Wolff, of Cornell University, showed that the stress state can be produced by a variety of noxious stimuli, physical as well as psychological. But Wolff emphasized that the action of physiochemical disease agents differs from psychosocial factors. The former have a direct pathogenic effect, while the latter act indirectly through their capacity to act as signals or symbols. Thus, psychosocial stressors increase the susceptibility of the organism to direct noxious stimuli, i.e., disease agents.[2]

In the 1930s and 1940s, attention in stress research turned to the identification of life events that were associated with the onset of physical illness and behavior disorder. Adolph Meyer advocated the use of a life chart as a tool in medical diagnosis. Meyer speculated that life events might be an important part of the etiology of a disorder, and that life events did not have to be catastrophic in order to be pathogenic.[3] In the 1960s, Holmes and Rahe developed the Social Readjustment Rating Scale (SRRS), which consists of 43 life

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[1]Walter B. Cannon, "Voodoo Death," in Stress and Coping: An Anthology, ed. Alan Monat and Richard S. Lazarus (New York: Columbia University Press, 1977), p. 89.

[2]Cassel, op. cit., p. 109.

[3]Barbara Snell Dohrenwend and Bruce P. Dohrenwend, eds., Stressful Life Events: Their Nature and Effect (New York: John Wiley and Sons, 1974), p. 3.

events that are weighted in terms of the individual adjustment required. According to Holmes and Rahe, the greater the magnitude of the life change, the greater the probability that the life change will be associated with disease onset, physiological or psychological, and the greater the probability that groups at risk will experience disease.

Holmes and Rahe defined stressful life events as those "whose advent is either indicative of or requires a significant change in the ongoing life pattern of the individual."[1] Both positive and negative events are considered stressful by Holmes and Rahe because they demand adjustments by the individual to a new style or pattern. Other theorists have expanded on this notion by hypothesizing that the superiority of change over undesirability as a measure of a stressful life event stems from the idea "that anxiety is the basic or initial preparatory response to environmental changes or stimuli" (although the appearance of some forms of disturbed behavior such as depression may depend on the quality of the life event and not the fact that it introduces change per se).[2] Hinkle stated:

> Changes in significant social or interpersonal relationship are very often accompanied by changes in habits, patterns of activities, changes in the intake of food or medication, and changes in exposure to potential sources of infection or

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[1] Ibid., p. 281.

[2] Joanne C. Gersten, Thomas S. Langer, Jeanne G. Eisenberg, and Lida Orzeck, "Child Behavior and Life Events," in Stressful Life Events: Their Nature and Effect, ed. Barbara Snell Dohrenwend and Bruce P. Dohrenwend (New York: John Wiley and Sons, 1974), p. 161.

> trauma. They are also frequently associated with changes in mood and with physiological changes directly mediated by the central nervous system.[1]

By the end of the 1940s,

> it was appreciated that changes in the relation of people to their social group and in their relation to other people of importance in their lives might represent stimuli sufficient to cause the central nervous system to initiate physiological reactions that could influence the course of disease. . . . Experimental evidence indicated that mediation of such neurally initiated reactions could be by way of the glands of internal secretion as well as by the effects of the autonomic and voluntary nervous system. . . . Probably any biochemical process in the cell could be influenced in some manner and to some degree by the central nervous system. Therefore, it seemed evident that there would probably be no aspect of human growth, development or disease that would in theory be immune to the influence of a man's relation to this social and interpersonal environment.[2]

Although scores on the SRRS-type scales have been consistently related to illness, their predictive power has been limited. Some persons can undergo extremely stressful events without exhibiting physiological or psychological symptoms. In recent years, therefore, psychologists and sociologists have suggested that no stimulus is a stressor to all people: a stressor must be perceived or appraised as such by the individual.[3] Cognitive theorists claim that

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[1]David Mechanic, "Discussion of Research Programs on Relations Between Stressful Life Events and Episodes of Physical Illness," in Stressful Life Events: Their Nature and Effect, ed. Barbara Snell Dohrenwend and Bruce P. Dohrenwend (New York: John Wiley and Sons, 1974), p. 10.

[2]Lawrence Hinkle, Jr., "The Effect of Exposure to Cultural Change, Social Change, and Changes in Interpersonal Relationships on Health," in Stressful Life Events: Their Nature and Effect, ed. Barbara Snell Dohrenwend and Bruce P. Dohrenwend (New York: John Wiley and Sons, 1974), p. 88.

[3]Monat and Lazarus, eds., op. cit., p. 15.

> emotional experience and to some extent physiological and performance measures are in part a function of the perceptions, expectations, or cognitive appraisal which the individual makes of the situation.[1]

Schwartz stated that psychosocial stress never acts on the body in a vacuum. In involves "a complex interaction of biological and psychological processes that mediate the stress response."[2] Mechanic pointed out that a major current theoretical issue in stress research

> concerns the advisability of focusing on adaptive changes regardless of their social or personal desirability as compared with events which are experienced as threatening or distressing. The life change approach implies that the significance of stress events is that they demand adaptation, which is in itself costly to the organism as demands increase. This notion is like Selye's concept of stress as a nonspecific bodily response that is wearing on the biological system. It is less consistent with cognitive theories of stress that give emphasis to perceptions of threat, loss and challenges to self esteem. Whereas the life-change conception does not appear to require consideration of psychological intervening variables, the cognitive perspective depends on them.[3]

A typical psychological definition of stress is a "state where the well-being of an individual is endangered and he must devote all of his energies to its protection."[4]

The position taken by the writer is that it is relevant to look at stress in terms of both readjustment and perceived threat and

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[1]Joseph E. McGrath, "Settings, Measures and Themes: An Integrative Review of Some Research on Social-Psychological Factors in Stress," in Stress and Coping: An Anthology, ed. Alan Monat and Richard S. Lazarus (New York: Columbia University Press, 1977), p. 67.

[2]Gary E. Schwartz, "Stress Management in Occupational Settings," Public Health Reports 95 (1980): 99-108.

[3]Mechanic, op. cit., p. 91.

[4]C. N. Cofer and M. H. Appley, Motivation: Theory and Research (New York: John Wiley and Sons, 1965), p. 463.

that the degree of stress experienced will vary in terms of whether the stressful situation requires only an adjustment or requires an adjustment and is also perceived as threatening. Dohrenwend and Dohrenwend spoke to this approach as follows:

> Even if every life event is stressful to some degree, it does not follow that all life events must be stressful to the same degree, and, in fact, investigators have assumed that life events vary in stressfulness. One of the central issues that has guided research on stressful events is therefore: What are the properties or conditions that distinguish more stressful from less stressful life events?[1]

Brown stated that some element of loss is the most important component of long-term threat. Long-term threat is that implied about one week after its occurrence.[2] Monat stated that the importance of the anticipation of harm in the production of stress reactions (physiological and psychological) is well supported:

> Shannon and Isbell (1963) have demonstrated that anticipation of a dental anesthetic injection results in the same amount of physiological stress reaction as the actual injection. Epstein (1967) has indicated that sport parachutists exhibit marked physiological and psychological stress prior to a jump. In the laboratory, Birnbaum (1964) and Nomikos et al. (1968) have shown that unpleasant motion pictures elicit anticipatory physiological stress reactions. Moreover, considerable research has been done on the antecedent conditions which may affect the appraisal of threat and the resulting stress reactions: such as, past experience (Epstein, 1967), availability of response options (Averill and Rosenn, 1972; Elliot, 1965; Pervin, 1963); personality dispositions (Hodges and Spielberger, 1966; Lazarus and Averill, 1964) and uncertainty (D'Amato and Gumenik, 1960; Monat, Averill, and Lazarus, 1972).[3]

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[1]Dohrenwend and Dohrenwend, op. cit., p. 4.

[2]George W. Brown, "Meaning, Measurement and Stress of Events," in Stressful Life Events: Their Nature and Effect, ed. Barbara Snell Dohrenwend and Bruce P. Dohrenwend (New York: John Wiley and Sons, 1974), p. 231.

[3]Monat, op. cit., p. 4.

Haggard pointed out that an individual's ability to tolerate and master stress depends on the extent to which he knows all aspects of the situation so that he is not helplessly unaware of the nature and source of the threat.[1] The importance of having information about the occurrence of a potential stressor in alleviating stress has been shown by Luby et al. (1962) and Elliot (1966) and Fritz and Marks (1954).[2]

Other mediators between stress and strain that theorists have identified are the individual's social support system or social resources and the individual's coping skills. Social resources are represented in the interpersonal networks of which people are a part and which are a potential source of support: family, friends, fellow workers, neighbors, and voluntary associations. Gore's (1978) study of unemployed men indicated that strain in the form of depression and more frequent illness was considerably lessened among those with supportive marital relations and ties to extended family and peer groups.[3] The importance of social support in reducing strain has been confirmed by others (Nuckolls et al., 1972; Totman, 1979; Antonovsky, 1974; Leighton et al., 1963).[4]

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[1]Appley and Trumbull, op. cit., p. 62.

[2]McGrath, op. cit., p. 69.

[3]Nan Lin, Walter M. Ensel, Ronald S. Simeone, and Wen Kuo, "Social Support, Stressful Life Events, and Illness: A Model and an Empirical Test," Journal of Health and Social Behavior 20 (1979): 108-19.

[4]Ibid.

Coping refers to efforts to master conditions of harm, threat, or challenge when a routine or automatic response is not readily available.[1] White stated:

> It is clear that we tend to speak of coping when we have in mind a fairly drastic change or problem that defies familiar ways of behavior, requires the production of new behavior, and very likely gives rise to uncomfortable affects like anxiety, despair, guilt, shame or grief. . . .[2]

Coping is capable of modifying, eliminating, or changing the emotion associated with stress.[3] Lazarus suggested that there are two main forms of coping: direct actions and palliative modes.[4] Direct actions are behaviors such as flight or fight, which are designed to alter a troubled relationship with one's social or physical environment. Palliative modes of coping refer to thoughts or actions whose goal is to relieve the emotional impact of stress (the physical or psychological consequences). The term palliative is used because these methods do not actually alter the threatening or damaging situation but make the person feel better. Palliative methods can be intrapsychic (defense mechanisms) or somatic (biofeedback). Antonovsky identified three types of resistance resources that mediate the impact of life crises: homeostatic flexibility, the ability to accept alternatives and the perception of the availability of such alternatives; ties to concrete others; and ties to the total community.[5]

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[1]Monat and Lazarus, op. cit., p. 8.

[2]Ibid. [3]Ibid., p. 9. [4]Ibid.

[5]Aaron Antonovsky, "Conceptual and Methodological Problems in the Study of Resistance Resources and Stressful Life Events," in Stressful Life Events: Their Nature and Effect, ed. Barbara Snell Dohrenwend and Bruce P. Dohrenwend (New York: John Wiley and Sons, 1974), pp. 251-54.

Research on occupational stress takes the following perspectives: the effects of unemployment, the effects of anxiety on performance, the causes of job-related stress, and stress management at work.

The Social Readjustment Scale of Holmes and Rahe assigns being fired from a job a life change unit (LCU) score of 50 and places the event eighth in a hierarchy of the required amount of readjustment to life change.

Theorists have speculated that the effects of anxiety on performance correspond to an inverse U-shaped function between arousal and efficiency.[1] Maladaptive behavior occurs at levels of extremely low and high arousal. Antonovsky stated that stress is a state of the organism in which energy is used in continuously dealing with problems over and above energy that would have been demanded had the problem been resolved.[2] This idea is consistent with the classical psychoanalytic position of the effects of anxiety on performance.

Manuso (1974) summarized the major classes of psychosocial stress faced by workers:

work overload or work stagnation;

extreme ambiguity or rigidity in relation to one's tasks;

extreme role conflict or little conflict;

extreme amounts of responsibility, or little responsibility;

cut-throat and negative competition or no competition;

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[1]Gersten et al., op. cit., p. 167.

[2]Antonovsky, op. cit.

constant change and daily variability or a deadening routinized stability;

ongoing contact with stress carriers or social isolation;

the corporation for its own survival encourages its employees to define their egos in terms of the organization, to contain emotional reactions, and to depend on it; and

the interaction of one's state of career development, career opportunity, and management style.[1]

Pearlin (1978) in a study of 100 subjects concluded: Coping is least effective in areas of life such as work that are impersonally organized and that are beyond personal coping controls. In occupational roles, he found, the most effective types of coping involve manipulation of goals and values that involve the devaluation of the intrinsic rewards of work and a valuation of the extrinsic rewards such as pay and fringe benefits. He noted: The problems arising in relation to one's occupation are less amenable to coping either by weight of one's personality or by weight of response patterns than are problems occurring elsewhere.[2]

Identification of the Problem

The problem is that the traditional notion of job security with tenure has been disturbed under conditions of financial crisis in higher education. The consequences of this change have not yet

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[1]Schwartz, op. cit., p. 100.

[2]Leonard I. Pearlin and Carmi Schooler, "The Structure of Coping," Journal of Health and Social Behavior 19 (March 1978): 2-21.

been researched. One can speculate that it will affect the number of young scholars who choose to enter the academic profession, will decrease morale among those who remain in the profession even if they are not laid off, will have stress-induced physiological and psychological consequences for some involved in the layoff environment, and will have as a byproduct a decrease in academic productivity. This research proposes to examine the effect of projected layoffs on faculty productivity. Because a university's reputation and ability to attract scholars depends to a large extent on the quality of faculty output, such a consideration has long-term relevance.

Focus of the Problem

The focus of the problem is a comparison of faculty productivity in academic year 1979-80 as compared with productivity in academic year 1980-81.

Purpose of the Study

The purpose of this research is threefold:

1. To examine the effects of a stressful environment on productivity;

2. To propose some intervention techniques to assist in stress management; and

3. To contribute further to the research on stress.

This research can contribute to the current state of knowledge about stress and support certain intervention techniques in the following ways:

1. It will measure the consequences stress has on productivity;

2. It will test the idea that cognitive perceptions about the degree of threat produce differences in the amount of stress experienced;

3. It will examine whether or not stress is moderated by social support; and

4. It will support certain types of intervention techniques in layoff situations in higher education: If faculty experience less stress when they have social support and a sense of options, then approaches to effective stress management in layoff situations would include the provision of some form of social support, retraining, and assistance with placement.

Definition of Terms

The following terms are used throughout the study and are defined to provide clarification for the reader:

Stressor--A term used to describe a stimulus in the environment that requires adaptation or readjustment.

Stress State or Stress--A term used to describe the state within an individual that results from the interaction of the individual with stressors.

Strain--A term used to define the physiological, emotional, and behavioral consequences of stress that presumes a change for the worse in functioning or health.

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Strain--A term used to define the physiological, emotional, and behavioral consequences of stress that presumes a change for the worse in functioning or health.

Productivity--A term used to define faculty output--specifically, the number of articles completed and submitted to refereed and nonrefereed journals in an academic year, the number of books completed in an academic year, and the number of research proposals submitted in an academic year.

Social Support or Resources--A term that represents the interpersonal networks of which people are a part and which are a potential source of support.

Adrenals--Endocrine glands that lie (one on each side) just above the kidneys. They consist of a whitish outer cortex, or bark, and a dark brown medulla, or marrow.

Arousal--General state of cortical alertness that follows from sensory stimulation.

Coping--A term used to refer to efforts to master conditions of harm, threat, or challenge when a routine or automatic response is not readily available.

Occupational Locking-In--A term that refers to the feeling of an individual that there is almost no opportunity to move from the current job or that the only position for which he or she is qualified is the job currently held.

High-Change Department--A term used to designate a department in the university anticipating either many layoffs or dissolution.

Moderate-Change Department--A term used to designate a department in the university anticipating some layoffs.

Low-Change Department--A term used to designate a department in the university anticipating few or no layoffs.

Tenure--A term used to describe the concept that a faculty appointment will be continued until retirement unless there is dismissal for adequate cause or unavoidable termination.

Testable Hypotheses

As stated previously, to call the work situation at MSU in the academic year 1980-81 stressful is consistent with explanations of situations that are designated stressful by theorists.[1] It represented a change in past practice, and it was new, intense, rapidly changing, and unexpected. To expect that faculty experienced stress is consistent with both the change or readjustment concept of stress (Holmes and Rahe) and the cognitive, perceptual concept of stress (Lazarus). The overload of meetings and discussions among faculty and within departments concerning layoffs and the abrogation of tenure was a change in the usual routine that required readjustment and probably was experienced by faculty as overload. The change in image and plan associated with the abrogation of tenure was anxiety-producing.[2] Other characteristics of the situation that undoubtedly

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[1]I am taking the position that Brown took in his research on stress; i.e., I am considering the meaningfulness of events in common-sense terms: "Given knowledge of behavior, experience, and circumstances, how would it be reasonable to expect an individual to react?" According to Brown, this approach avoids the risk of invalidity that must be present when personal meaning is allowed full play, and it means that resulting estimates of the role of life events are bound to be conservative since events that proved stressful for idiosyncratic reasons will be missed (Brown, op. cit., p. 237).

[2]Carson stated: Image includes all knowledge of the world, correct or incorrect, that the particular organism possesses. It also includes all the values that the person has acquired. The image may be thought of as the individual's cognitive map of the structure and functioning of the universe. The exploitation of the image is

aggravated the stress experienced were the ambiguity and lack of information provided by management and the length of time over which the stressful situation occurred.

The following hypotheses were tested to determine the effects of stress in the work environment:

> Hypothesis I: Faculty in low-change departments will report experiencing little or no stress; faculty in moderate-change departments will report experiencing moderate stress; and faculty in high-change departments will report experiencing high stress.
>
> Hypothesis II: There will be a negative relationship between reported amount of stress and productivity as measured by the difference between productivity in academic year 1980-81 and productivity in 1979-80.
>
> Hypothesis III: There will be a negative relationship between reported level of feeling locked into a job and amount of productivity.
>
> Hypothesis IV: There will be a positive relationship between reported social support resources and amount of productivity.

Overview

In Chapter I, the purpose and significance of the research were described, and a problem statement and testable hypotheses were presented. Chapter II is a review of the literature on stress. In Chapter III, the research design is discussed and a model of the stress process is proposed. The research results are given in

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accomplished by means of plans, which are hierarchically ordered processes that control the order in which a sequence of operations (behavior) is to be performed. According to Carson, "enforced abandonment of plans, especially those of a strategical order, is believed to induce intensified emotionality, which may manifest itself as anxiety if it cannot be contained by the provision of a focus for it in the image." (Robert C. Carson, Interaction Concepts of Personality [Chicago: Aldine Publishing Company, 1969], pp. 83-87.)

Chapter IV. In Chapter V, the research results are discussed and a summary of the research findings and implications for future research are presented.

CHAPTER II

A REVIEW OF THE LITERATURE

In this chapter are reviewed the meaning of the stress concept, the effects of stress on productivity, and factors in the environment that moderate stress.

What Is Stress?

Stress is an abstract concept that encompasses ideas about etiology and effects.[1] In the first section of the literature review, the development of the stress concept is covered and the terms stressor, stress state or stress, and strain are differentiated.

Hans Selye popularized the term stress in his book, The Stress of Life, published in 1956. He defined stress in the "medical sense" as describing the state of wear and tear on the body or the "non-specific responses of the body to any demand."[2] Selye demonstrated that stress can be objectively measured by certain changes in the body's structure and chemical composition. Some of these changes are signs of damage; others are manifestations of the body's adaptive reactions or mechanisms of defense against stressors. Selye stated that stress can be recognized subjectively by anyone who feels that

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[1]Hans Selye, The Stress of Life (New York: McGraw-Hill Book Co., 1978), p. 53.

[2]Ibid., p. 1.

whatever he or she is doing or whatever is being done to him or her is wearing or strenuous and results in feelings of being tired, jittery, or ill.[1] In summary, Selye characterized stress as a response to an internal or external stimulus whose characteristics require adaptation. Faulty adaptation could result in death or disease.

During the 1950s, Harold Wolff, a researcher at Cornell University, began to examine life events in terms of the psychophysiological reactions they evoked and their causative role in the history of many diseases. Wolff believed that psychosocial stressors could have an indirect disease-causing effect through their capacity as signals or symbols that trigger responses to the information they are perceived to contain. These responses will alter the endocrine balance in the body and thereby increase the susceptibility of the organism to disease agents that it harbors or to which it is exposed.[2] Wolff's work was based on the ideas of Adolph Meyer. Meyer devised a life chart for organizing medical data as a dynamic biography of the relationship between biological, psychological, and sociological phenomena and health and disease.[3] Thomas Holmes and Richard Rahe used the life chart on over 5,000 patients at Cornell University Medical College and New York Hospital to study the quality and

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[1] Ibid.

[2] John Cassel, "The Contribution of the Social Environment to Host Resistance," American Journal of Epidemiology 104 (1976): 109-11.

[3] Adolph Meyer, "The Life Chart and the Obligation of Specifying Positive Data in Psychopathological Diagnosis," in The Collected Papers of Adolph Meyer, vol. 3: Medical Teaching, ed. E. E. Winters (Baltimore: The Johns Hopkins Press, 1951), pp. 52-56.

quantity of life events empirically observed to cluster at the time of disease onset.[1] Subsequently, Holmes and Rahe developed a schedule of recent life events that were observed to cluster at the time of disease onset. (See Appendix A.) According to Holmes and Rahe, one theme was common in all these life events: "The occurrence of each usually evoked or was associated with some adaptive or coping behavior on the part of the involved individual."[2] The next step in their research was to estimate the magnitude of adaptation these life events required. Assuming that "participants in the contemporary American way of life could utilize [their] innate psychological capacity for making quantitative judgments about psychosocial and psychophysical phenomena,"[3] Holmes and Rahe used judges' ratings to develop the Social Readjustment Rating Scale (Appendix A) in which 43 life events were assigned a life change score based on their assessment of the amount of readjustment required by each event. To calculate an individual's total stress in a given period, life change scores were summed. In conclusion, Holmes and Rahe defined stress as life events that require significant change in the ongoing life pattern of the individual. Their assumption was that "individual appraisal of the nature of these events is not relevant or does not vary enough to contribute to differences in adaptive consequences."[4]

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[1]Thomas Holmes and Richard Rahe, "The Social Readjustment Rating Scale," Journal of Psychosomatic Medicine 11 (1967): 215.

[2]Ibid., p. 217. [3]Ibid.

[4]Richard Lazarus et al., "Psychological Stress and Adaptation: Some Unresolved Issues," in Selye's Guide to Stress Research, ed. Hans Selye (London: Von Nostrand Reinhold Co., 1980), p. 92.

The work of Selye, Wolff, Meyer, and Holmes and Rahe led to follow-up research by others who investigated the specific effects of stressful life events. Since the 1950s, an "exceptional number of studies have suggested that stressful life events precipitate somatic and psychological disease,"[1] and two alternate views have emerged concerning what makes a life event stress-inducing. On the one hand, a life event is considered stressful if it causes changes in and demands readjustment in an average person's normal routine.[2] The notion that life change per se produces stress is compatible with a common view of stress as a condition of perceived imbalance between environmental demands and the capability of the individual to meet these demands. On the other hand, a life event is considered stressful if it is undesirable or threatening.[3] On this basis, another readjustment scale has been developed that reflects the undesirability ratings of particular life events. (See Appendix B.) At the present time, it is generally accepted that the crucial factor in a stressful life event is its undesirable or threatening quality and that that is its link to subsequent symptomatology. This has been affirmed in epidemiological studies conducted by Miller, Ingham, and Davidson;

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[1]Suzanne C. Kobasa, "Stressful Life Events, Personality and Health: An Inquiry Into Hardiness," Journal of Personality and Social Psychology 37 (1979): 1.

[2]Ibid., p. 2.

[3]Daniel P. Mueller, Daniel W. Edwards, and Richard M. Yarvis, "Quality of Life Events and Their Relationship to Strain," Schizophrenia Bulletin 7 (1981): 34-39.

Prusoff and Uhlenhuth; and Vinokur and Selzer.[1] This point of view is consistent with Selye's distinction between eustress and distress: "Since eustress [a desirable event or stimulus] represents no threat to well-being or health, distress . . . for simplicity's sake . . . is commonly referred to merely as stress."[2] This is a much more complex view of stress; stress results when an individual perceives events as "harmful, threatening and involving loss."[3]

Conceptualizing stress in this way has led researchers to examine the characteristics of life events that are perceived as undesirable and/or threatening. Streiner et al. found that uncontrolled and unanticipated negative events were correlated with strain, the adverse physiological, emotional, and behavioral consequences of stress. Those events over which the subjects had no control were the most strongly correlated with strain regardless of whether or not the events were anticipated.[4] Spring also defined stress as stimuli that occurred regardless of the actions or characteristics of the individual

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[1]P. McC. Miller, J. G. Ingham, and S. Davidson, "Life Events, Symptoms and Social Support," Journal of Psychosomatic Research 20 (1976): 521; E. S. Paykel, B. A. Prusoff, and E. H. Uhlenhuth, "Scaling of Life Events," Archives of General Psychiatry 25 (1971): 340; Amiram Vinokur and Melvin Selzer, "Desirable Versus Undesirable Life Events: Their Relationship to Stress and Mental Disease," Journal of Personality and Social Psychology 32 (1975): 329.

[2]Selye, The Stress of Life, op. cit., p. 371.

[3]Lazarus et al., op. cit., p. 106.

[4]David L. Streiner et al., "Quality of Life Events and Their Relationship to Strain," Schizophrenia Bulletin 7 (1981): 34-39.

on whom they had an impact.[1] Johnson and Sarason stated: "It is the individual who experiences high levels of change but feels . . . no control over events who is most susceptible to the effects of life stress."[2] Brown and Birley concluded in their study that stressful life events involved danger; significant changes in health, status or way of life; the promise of these; and important fulfillments or disappointments.[3] Myers, Lindenthal, and Pepper defined crises or stressful events as experiences involving role transformations, changes in status or environment, and the imposition of pain.[4] Antonovsky and Kats perceived stress as involving role transformations.[5] Vinokur and Selzer saw three dimensions that contributed to the stressfulness of an event: unpredictability, anticipation, and lack of control over outcome.[6]

The conceptualization of stress as distress also has stimulated explorations of the cognitive and personality factors involved

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[1]Bonnie Spring, "Stress and Schizophrenia," Schizophrenia Bulletin 7 (1981): 28.

[2]James H. Johnson and Irwin G. Sarason, "Life Stress, Depression and Anxiety: Internal-External Control as a Moderator Variable," Journal of Psychosomatic Research 22 (1978): 207.

[3]G. W. Brown and J. L. T. Birley, "Crises and Life Changes and the Onset of Schizophrenia," Journal of Health and Social Behavior 9 (1968): 204.

[4]J. K. Myers, J. J. Lindenthal, and M. P. Pepper, "Social Class, Life Events and Psychiatric Symptoms: A Longitudinal Study," in Stressful Life Events, ed. B. S. Dohrenwend and B. P. Dohrenwend (New York: John Wiley and Sons, 1974), p. 399.

[5]A. Antonovsky and R. Kats, "The Life Crisis History as a Tool in Epidemiological Research," Journal of Health and Social Behavior 8 (1967): 16.

[6]Vinokur and Selzer, op. cit., p. 336.

in the perception of a life event as a stressor. The undesirability of an event may be interpreted differently, depending on a person's prior experiences and particular vulnerabilities. A central issue in stress research has become whether or not stressful life events are idiographic or monothetic in character. Selye stated:

> It may be said without hesitation that for man the most important stressors are emotional, especially those causing distress. . . . Purely physical demands upon the tissues of our body . . . are far less commonly met in normal life than the emotional stimuli with which we are almost constantly faced: besides, even somatic reactions affect us largely because of the nervous responses (pain, fear and frustration) which they evoke. This is probably because among all living things, man has the most complex brain and is the most dependent upon it. Thus, it is true that, in our life events, the stressor effects depend not so much upon what we do or what happens to us but on the way we take it.[1]

Hinkle argued that "people react to their life situations or social conditions in terms of the meaning of these situations to them."[2] In their review of stress research, Appley and Trumbull drew a similar conclusion: "With the exception of extreme life-threatening situations, it is reasonable to say that no stimulus is a stressor to all individuals exposed to it."[3] Spielberger concluded: "Presumably, the appraisal of a situation as physically or psychologically dangerous or threatening will be determined by individual differences in

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[1] Selye, The Stress of Life, op. cit., p. 370.

[2] L. E. Hinkle, "The Concept of Stress in the Biological and Social Sciences," Social Science and Medicine 1 (1973): 46.

[3] M. H. Appley and R. Trumbull, eds., Psychological Stress (New York: Appleton-Century-Crofts, 1967), p. 7.

aptitudes, skills and personality dispositions and by personal experience with similar situations in the past."[1]

In summary, while debating whether psychosocial factors are generally noxious or idiographic in their effects, at the same time researchers have attempted to identify the attributes of events that evoke major neuroendocrine changes associated with the stress state in the recipients. Each of the following characteristics has been treated by at least three researchers as the critical dimension of a life event that is stress-inducing: change in the life pattern or activities of the individual, undesirability (a subjective perception of the event as threatening), unpredictability, and absence of control over the outcome.

Concerned with the differences among stressor, stress state, and strain, Marsella and Snyder distinguished between stressor content, stressor descriptors, stress states, and stress state contents. Stressor content focuses on the quality of the demand characteristics of the stressor. Stressor content is classified in the following categories: acculturation stressors, role-conflict stressors, goal-striving-discrepancy stressors, value-conflict stressors, life-change stressors, role-deprivation stressors, noxious stressors, social-change stressors, and nutritional-deprivation stressors. Stressor descriptors refer to the various parameters of stressors that can be measured: frequency, intensity, duration, complexity, discriminability, controllability, familiarity, predictability, and conflictual. Stress

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[1]Charles D. Spielberger, ed., Anxiety, Current Trends in Theory and Research, 2 vols. (New York: Academic Press, 1972), p. 489.

states are the organismic-experiential conditions that emerge from the interaction of stressors and situational and personal mediators. Stress-state contents refer to particular patterns of organismic experiences characterized by positions on the following parameters: system overload, system underload, positive, negative, high arousal, and low arousal.[1]

Thus far, a distinction has been made among stressor, stress state or stress, and strain. A stressor is a stimulus that produces distress, i.e., is perceived as harmful and threatening and may involve loss. A stress state is the initial adaptive physiological, emotional, and behavioral response to the stressor. Strain is the psychophysiological and behavioral effect of prolonged and severe stress.

Figure 2.1 provides a description of the stress process that differentiates among the concepts, stressor, stress, and strain. It starts with a recent event in the life of an individual rather than a distant childhood experience. The initial step also distinguishes between a stressor, an event that initiates the stress and the immediate reaction to that event, the state of stress. The next step in the model suggests that what follows depends on the mediation of situational and personal factors that constitute the context in which the stress state occurs. The final step in the model indicates that a state of stress interacts with situational and personal mediators

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[1]Anthony J. Marsella and Karen Snyder, "Stress, Social Supports, and Schizophrenic Disorders: Toward an Interactional Model," Schizophrenia Bulletin 7 (1981): 143-55.

to produce one of the following outcomes. A person who experiences stressful life events may as a result undergo psychosocial growth, resume his or her life without substantial permanent change, or experience a change for the worse in functioning or health, which is termed strain.

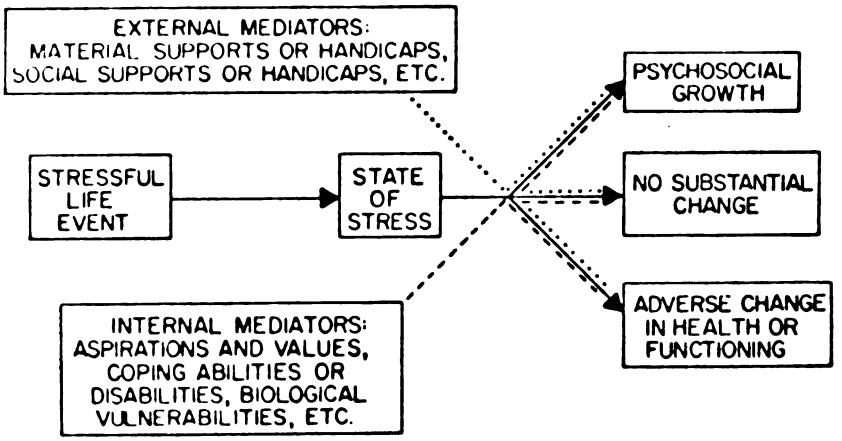

Figure 2.1.--Model of the life-stress process. (From B. S. Dohrenwend and B. P. Dohrenwend, "What Is a Stressful Life Event," in Selye's Guide to Stress Research, ed. Hans Selye, London: Von Nostrand Reinhold Co., 1980, p. 2.)

Having considered various ideas about what stress is, the next step in the review of the literature is to examine the stress state in more detail. The stress state has physiological, emotional, and behavioral components; the next three sections cover each consecutively.

Physiological Components of Stress

Walter B. Cannon drew attention to the physiological changes that occur when humans are faced with threatening situations in the

environment.[1] He formulated the emergency-function theory of the sympathetic nervous system and the adrenal medulla. The sympathetic nervous system is one of the two subdivisions of the autonomic nervous system and increases its activity during times of stress and arousal. The adrenal medulla is located in the inner part of an endocrine gland, the adrenal, which lies on each side of and just above the kidneys. The adrenal medulla is connected with preganglionic fibers of the sympathetic nervous system, and its secretory activity is controlled by nervous stimulation through these nervous pathways.[2] When a stressor is perceived, the central nervous system reacts with arousal and increased vigilance; this nervous stimulation causes the adrenal medulla to produce a hormone, adrenaline, which circulates throughout the body via the bloodstream. Cannon's view was that many of the physiological effects of adrenaline serve the goal of preparing the body to meet threatening situations by responding with either fight of flight.

> The hormones of the adrenal medulla act on all organs of the body enervated by the sympathetic nervous system, and generally produce effects similar to sympathetic stimulation. The stimulating effect on the heart, dilation of the coronary vessels, vasodilation in the voluntary muscles, vasoconstriction in the intestinal tract, decreased peristalsis of the alimentary canal, as well as metabolic actions such as mobilization of glucose and of fat, all form part of the "emergency function" serving to increase physical effectiveness under conditions of fight or flight.[3]

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[1]W. B. Cannon, Bodily Changes in Pain, Hunger, Fear and Rage (Boston: Charles T. Branford Co., 1953).

[2]Marianne Frankenhaeuser, "Peripheral Catecholamines as Parameters in Behavioral Research," in Emotions, Their Parameters and Measurement, ed. Lennart Levi (New York: Raven Press, 1975), p. 210.

[3]Cannon, op. cit.

Hans Selye demonstrated a General Adaptation Syndrome (GAS), consisting of an alarm, resistance, and exhaustion stage, which occurs in response to a stressor. In the alarm stage, the adrenal cortex, located in the outer part of the adrenal, is activated through secretions of the hypothalamus, a part of the brain that regulates hormone secretion, and the pituitary, a small endocrine gland embedded in the bones of the skull just below the brain. The adrenal cortex produces pro- and anti-inflammatory hormones (gluco- and mineral corticoids) which are essentially pro- and anti-reactive parts of the body's defense system in the resistance or adaptation stage. Under sustained stress, these hormones can bring about immunosuppression, hypertension, and allergic hypersensitivity. The exhaustion stage is characterized by a premature aging due to wear and tear on the body.[1]

Selye hypothesized that the first effect of various stressors acting upon the body might reach the hypothalamus either over neural pathways or via a variety of chemical signals. He pointed out that any stressor that acts upon the body produces dual effects. It acts directly on tissues, a local adaptation syndrome, and indirectly, by sending via hormones antagonistic chemical messages either to treat from or ignore the stressor or to contain and destroy it.[2] Selye concluded that the GAS was always based on combinations of these two types of responses--passive tolerance and retreat or attack--and

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[1]Selye, The Stress of Life, op. cit., pp. 36-38.

[2]Ibid., p. 122.

that survival in response to a stressor depended on a correct blending of them.[1]

The actions of the adrenal medulla and the adrenal cortex are only one aspect of the body's stress response. The principal coordinating systems of the body are hormonal and nervous. Groen summarized findings which conclude that the reticular formation and the limbic system, phylogenetically very old parts of the brain, respond to stressors by causing the release of neurotransmitters, i.e., noradrenaline and acetycholine, in the central and peripheral nervous systems.[2] Dale Loewi and Von Euler first showed that both noradrenaline and acetycholine are produced at nerve endings, and it is through these fundamentally antagonistic nerve hormones that the brain and the nerves exert their manifold actions.[3] These hormones carry pro- and anti-defensive messages, the former to act or advance and the latter to relax or retreat. The voluntary muscles are innervated by antagonistic nerve fibers as are the involuntary muscles.

This description of the physiological responses of the body to stressors is by necessity simplistic. The important fact to remember is that in accord with Selye, many scientists have concluded that "virtually every organ and every chemical constituent of the

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[1]Ibid.

[2]J. J. Groen, "Measurement of Emotion and Arousal in the Clinical Physiological Laboratory in Medical Practice," in Emotions: Their Parameters and Measurement, ed. Lennart Levi (New York: Raven Press, 1975), pp. 730-31.

[3]Selye, The Stress of Life, op. cit., p. 149.

human body is involved in the general stress reaction."[1] Selye has drawn a rough sketch of the general stress response, which appears in Figure 2.2.

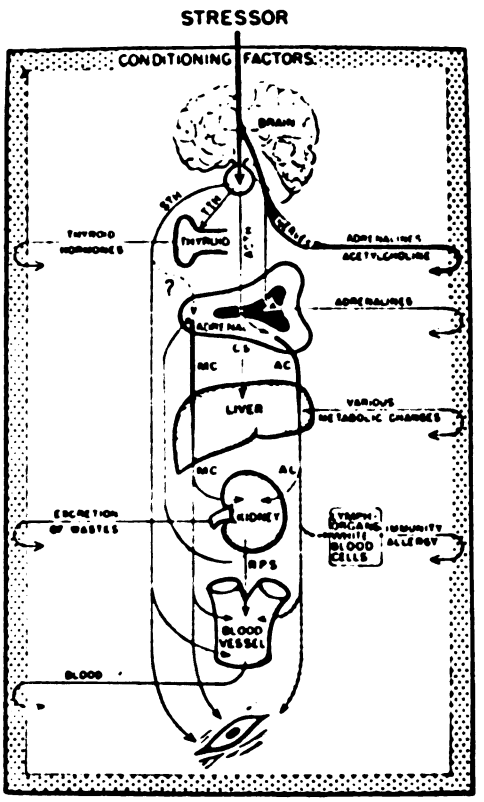

Figure 2.2.--Synoptic view of the whole stress mechanism. In this figure, the whole field represents the entire body. The conditioning factors, i.e., heredity, previous exposures, diet, and so on, are symbolized by the dotted frame from within which all reactions must develop. (From Hans Selye, The Stress of Life [New York: McGraw-Hill Book Co., 1976], p. 151.)

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[1]Ibid., p. 146.

psychological specificity and physiological specificity. Psychological specificity models attribute a particular physical disorder to a specific attitude, personality profile, or conflict. Physiological specificity models infer that an individual reacts to various kinds of stressors in a particular way.[1] Wolff hypothesized, for example, that an individual has a typical, consistent, and genetically determined pattern of somatic response to stress.[2] Today, the dominant outlook in stress research favors the generality model; in other words, that stress is the nonspecific response of the body to any demand. However, Selye himself pointed out that the GAS and the LAS (local adaptation syndrome) are interdependent. GAS can influence LAS and LAS, if sufficiently severe, can produce GAS.[3] Further, Selye stated that "selective conditioning explains why every person reacts somewhat differently to stress, depending upon . . . inherited and acquired characteristics."[4] This idea is similar to Brown and Birley's diathesis-stress model,[5] in which the outcome of a stress state is influenced by physiological predisposition, early childhood experience, and personality.

A discussion of the physiological components of stress is important because the loss of a job or the anticipation of the loss of

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[1]Aaron Beck, "Cognitive Anxiety and Psychophysiological Disorder," in Anxiety: Current Trends in Theory and Research, ed. Charles D. Spielberger (New York: Academic Press, 1972), pp. 343-45.

[2]Ibid.

[3]Selye, The Stress of Life, op. cit., p. 400.

[4]Ibid., p. 152.

[5]Spring, op. cit., p. 31.

a job has been shown to be a potent psychosocial stressor. Given individual vulnerabilities and prolonged and intense stimuli of this kind, diseases of adaptation or strain can occur. These include, among others, shock, high blood pressure, heart attacks, peptic ulcers, diabetes, hyperthyroidism, and lowered immunity in general. Levi explained this process as follows:

> Whenever exposed to environmental change, the human organism reacts with a set of processes which are phylogenetically old, . . . These processes seem to comprise a preparation for coping with the environment. The nonspecific subjective elements of the response may be labeled psychological "arousal" or "activation". . . . Similarly, the physiological concomitant of these subjective reactions can be seen as adaptive originally, namely by preparing the organism for muscular activity. . . . However purposeful these psychophysical . . . reactions may have been, . . . they do not appear to be appropriate in the adaptation of modern man to a great number of socioeconomic and psychosocial changes, conflicts and threats confronting him in a highly industrialized urban society. Furthermore, for social reasons, modern man often has to repress many of his emotional outlets and motor activities. This creates a situation that might very well involve a discrepancy between the subjective elements of emotion, the neuroendocrine concomitants of emotion, and the psychomotor activities likely to accompany such emotion. . . . It has been hypothesized that this "stress or arousal" pattern of response to psychosocial stimuli and/or this psychophysiological discrepancy, if it persists, and coping is unsuccessful, may become pathogenic.[1]

Levi devised an ecological model for psychosocially mediated disease, which appears in Figure 2.3.

In Figure 2.3, psychosocial stimuli are "stimuli suspected of being able to cause disease, that originate in social relationships or arrangements, i.e., the environment, and affect the organism through the medium of higher nervous processes." An individual's

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[1]Levi, op. cit., pp. 706-707.

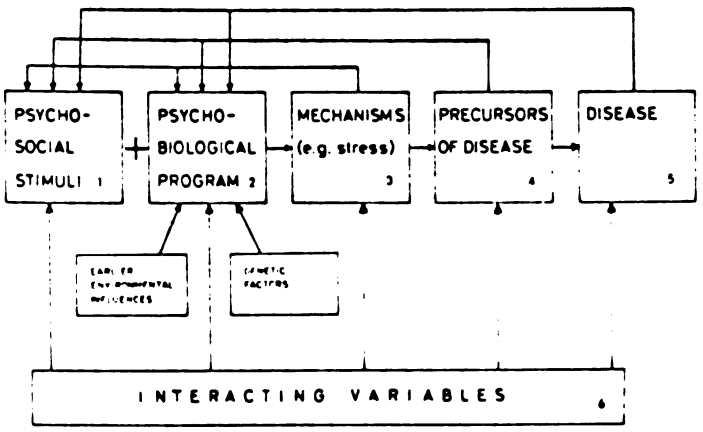

Figure 2.3.--An ecological model for psychosocially mediated disease. In the model a variety of social structures and processes produce a relatively small number of psychosocial stimuli (1). The combined effect of such stimuli and the psychobiological program (2) determines psychological and physiological reactions (3) of each individual. These may under certain circumstances lead to precursors of disease (4) and to disease itself (5). This sequence of events can be promoted or counteracted by interacting variables (6). The sequence is not a one-way process but constitutes part of a cybernetic system with continuous feedback. (From Lennart Levi, ed., Emotions: Their Parameters and Measurement [New York: Raven Press, 1975], p. 707.)

psychobiological program is a "propensity to react in accordance with a certain psychophysiological pattern, e.g., when solving a problem or adapting to an environment." Determinants of this program in an organism are genetic factors and earlier environmental influences. Mechanisms are "reactions in the organism, e.g., anxiety, induced by psychosocial stimuli that under some conditions of intensity, frequency or duration, and in the presence of certain interacting variables, can lead to disease." Precursors of disease are "malfunctions in mental

or physical systems that have not resulted in disability but which, if continued, will do so." Disease is a

> disability caused by mental and somatic malfunction. Disability is failure in the performance of a task. This must always include tasks considered essential, might include tasks considered normal, and, when more is known will include tasks that are considered optimal.

Interacting variables are "intrinsic or extrinsic factors, mental or physical, that alter the action of 'causative' factors at the mechanism, precursor or disease stage." Alter means that "they promote or prevent the process that might lead to disease."[1]

Having considered the physiological components of stress, the remaining sections of this review of the literature discuss in turn mechanisms, or the emotional components of stress; disability, or the adverse performance effects of stress; and interacting variables, or factors that can ameliorate or exacerbate stress.

Emotional Components of Stress

Lader and Tyrer stated: "A reasonable hypothesis is that emotion is induced by the interaction of at least two states: high physiological arousal and appropriate sensory input."[2] Sigg added:

> In a physiological sense [emotion] has come to mean a departure from homeostasis that is subjectively experienced by strong feelings (i.e., love, hate, . . . joy, anger and fear). This imbalance manifests itself in neuromuscular, visceral and hormonal changes in preparation for overt acts which may or may not be executed. . . . Stimuli from the milieu interieur or

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[1] Ibid.

[2] Malcolm Lader and Peter Tyrer, "Vegetative System and Emotion," in Emotions: Their Parameters and Measurement, ed. Lennart Levi (New York: Raven Press, 1975), p. 759.

> the environment, resulting in responses which trespass homeostatic boundaries, undergo a cognitive elaboration. . . . This implies complex neural processing, probably involving the neocortex.[1]

Physiological arousal, a sign of the stress state, has been covered in the previous section. Also, the characteristics of stressors have been discussed in the section, What Is Stress? What has not been discussed yet is the individual's subjective or emotional[2] response to a stressor. Subjectivity refers to the awareness associated with various forms of psychological information.[3] MacLean stated that there are five main classes of psychological information: sensations, perceptions, propensions, emotions, and intellections.[4] In this section of the literature review, sensation, perception, propension, and emotion are discussed in terms of their roles in the stress state. A later section on cognition and personality covers intellection.

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[1]E. B. Sigg, "The Organization and Functions of the Central Sympathetic Nervous System," in Emotions: Their Parameters and Measurement, ed. Lennart Levi (New York: Raven Press, 1975), p. 93.

[2]MacLean distinguished between affect and emotion. Affect refers to the subjective aspects of emotion; emotion refers to the expressive aspects or verbal and nonverbal manifestations of emotion. Although this distinction is important and is discussed in the section on cognition and personality, in this section of the literature review the terms are used interchangeably. See Paul D. MacLean, "Sensory and Perceptive Factors in Emotional Functions of the Triune Brain," in Emotions: Their Parameters and Measurement, ed. Lennart Levi (New York: Raven Press, 1975), pp. 71-91.

[3]MacLean, op. cit., p. 72.

[4]Ibid.

Sensations represent "the raw feelings which . . . depend on the initiation of impulses resulting from the activation of interoceptors and exteroceptors."[1] Interoceptors are sense organs within the body proper which give information about visceral processes.[2] Exteroceptors are sense organs whose stimuli arise outside the body.[3] According to MacLean,

> Sensations become more informative as they are appreciated in terms of time and space; in such transformations they are introspectively recognized as perceptions. It is characteristic of sensations and perceptions that they depend on incoming signals to the brain from special afferent systems (conducting nervous impulses toward the brain or spinal cord) and cease to exist after the termination of such activity.[4]

This is in contrast to the three other classes of psychological information: propensions, emotions, and intellections, which are distinguished by MacLean from sensations and perceptions by their capacity to occur "after the fact." The "unexplained process" that makes this possible is referred to as mentation.[5] MacLean stated:

> Mentation involves self-regenerating neural replica of events either as they first occurred or in some rearrangement. How the original ordering of the events is preserved (i.e., memorized) or reordered (i.e., imagined or conceived) remains a mystery.[6]

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[1] Ibid.

[2] J. P. Chaplin, Dictionary of Psychological Terms (New York: Dell Publishing Co., 1975), p. 267.

[3] Ibid., p. 189.

[4] MacLean, op. cit., pp. 72-73.

[5] Ibid.

[6] Ibid.

To explain more concretely, according to views currently held among scientists, when an individual encounters a stimulus with stress-inducing attributes, sensations are produced via the activation of internal and sense organs, which themselves depend on information reaching the brain over nervous pathways. Very likely, this first encounter with a stressor is processed subliminally or outside conscious awareness.[1] Almost simultaneously, the sensation is transformed into a percept as it is tied to time and space. In most cases, a percept will be based on the objective properties of a stimulus, but in some cases it can be based on the symbolic meaning of the stimulus. In other words, a characteristic of human perception is that cues that have become associated with a prior experience can be responded to as if the experience itself were reoccurring. This generalizing tendency can facilitate or distort an individual's understanding of and response to an external stimulus depending on whether it evokes associations that are consistent or inconsistent with reality. Inconsistent with reality implies that most people living in the same culture would not perceive or respond to the stimulus in that way. Mandler described this process as follows:

> One of the cognitive systems operating in the human organism is concerned with the interpretation of experience or actions. These hypotheses about the system's own operations and its outputs in thought and action are not necessarily equivalent to either an accurate description of the events or to a testable theory about these events. Although many of the hypotheses apparently occur in consciousness, they need not do so, nor is it apparently the case that these hypotheses operate exclusively

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[1] Kenneth Pelletier, Toward a Science of Consciousness (New York: Delta Publishing Co., Inc., 1979), pp. 81-87.

> on the content of consciousness. Rather, structures and processes that are not available in consciousness frequently are used in the construction of these hypotheses about the self.[1]

Thus, an initial appraisal or mentation about the percept, which relates to memories and to an understanding about experiences associated with the percept, occurs. Depending on the content of this appraisal, feelings are produced that may or may not be consciously labeled as fear, anger, or depression, and these feelings are reinforced via feedback from the physiological changes that accompany arousal. Schachter explained as follows:

> When a cue arouses a person, his/her body undergoes physiological changes. In an attempt to understand and label these bodily responses, the person is motivated to get information about what is happening to him/her. Thoughts and perceptions based on the person's past experiences and whatever new information is received steer the person into labeling these feelings as fear, anger and so on. The labels given to his/her physiological arousal affect how the person behaves.[2]

Groen, Kielholz, and DeWied stated that the physiological changes associated with fear, anxiety, and anger are synonymous with those attributed to the stress state.[3] Spielberger equated anger with fear, and Spielberger and Lazarus and Averill concluded that

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[1]George Mandler, "The Search for Emotion," in Emotions: Their Parameters and Measurement, ed. Lennart Levi (New York: Raven Press, 1975), p. 13.

[2]Irving Janis, Stress and Frustration (New York: Harcourt Brace Jovanovich, Inc., 1971), p. 109.

[3]Groen, op. cit., p. 740; Paul Kielholz, "Psychopharmacology Measurement of Emotion in Medical Practice," in Emotions: Their Parameters and Measurement, ed. Lennart Levi (New York: Raven Press, 1975), p. 759; D. DeWied, "Pituitary-Adrenal System Hormones and Behavior," in Selye's Guide to Stress Research, ed. Hans Selye (New York: Von Nostrand Reinhold Co., 1980), p. 252.

anxiety and fear are emotional responses to stress.[1] Seligman showed how depression and helplessness can accompany stress.[2]

An individual's first response to a stressor, therefore, is physiological arousal that is subjectively experienced as fear or anxiety. Under certain circumstances, anger is a secondary emotional response to a stressor and is used as a psychological defense against fear and anxiety.[3] Specifically, fear, anxiety, and anger prepare an individual to meet a threatening stimulus with either flight or fight. The absence of an effective response to a stressor, or helplessness, can produce depression as a secondary emotional response.

According to Spielberger, fear is an "emotional reaction to the anticipation of injury or harm from some real or objective danger in the external environment."[4] Another characteristic of fear is that the intensity of the emotional reaction is proportional to the magnitude of the danger that evokes it.[5] When an individual experiences fear, there is a commitment to avoidance action; barring external or

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[1]Carroll E. Izard, "Anxiety, a Variable Combination of Interacting Fundamental Emotions," in Anxiety: Current Trends in Theory and Research, ed. Charles D. Spielberger (New York: Academic Press, 1972), p. 57; Spielberger, op. cit., p. 484.

[2]Martin Seligman, Helplessness (San Francisco: W. H. Freeman Co., 1975), pp. 92-93.

[3]Harry S. Sullivan, The Interpersonal Theory of Psychiatry (New York: W. W. Norton Co., Inc., 1953), p. 211.

[4]Spielberger, op. cit., p. 485.

[5]Ibid.

internal restraints, fear supports the action of flight.[1] Because fear is an objective response, an individual can meet a threat by rational and appropriate action. Usually, therefore, a fear response is of sudden and short duration.[2]

In contrast to fear, Spielberger noted that anxiety

> refers to the emotional reaction or pattern of response that occurs in an individual who perceives a particular situation as personally dangerous or threatening irrespective of the presence or absence of the objective danger.[3]

Lazarus and Averill stated:

> Symbolic cues and/or experiences that evoke conscious or unconscious images (memories) of past anxiety-producing situations can excite physiological postures that mimic the original reactions. . . . Thus, accidentally associated stimulus-response relationships may account for physiological changes.[4]

and thereby explained the role of propension in anxiety and in the stress state. Selye commented further:

> It is virtually impossible to distinguish between stressors and conditioning factors in human life. As a rule a problem arises because we are conditioned or predisposed to react in a certain way when meeting the stressors of daily life; but we could also say that normal life events may turn otherwide inconsequential conditioning factors into potent stressors.[5]

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[1]Seymore Epstein, "The Nature of Anxiety With Emphasis Upon Its Relationship to Expectancy," in Anxiety: Current Trends in Theory and Research, ed. Charles D. Spielberger (New York: Academic Press, 1972), p. 312.

[2]Raymond Cattell, "The Nature and Genesis of Mood States," in Anxiety: Current Trends in Theory and Research, ed. Charles D. Spielberger (New York: Academic Press, 1972), p. 165.

[3]Spielberger, op. cit., p. 489.

[4]James Lazarus and James Averill, "Emotion and Cognition With Special Reference to Anxiety," in Anxiety: Current Trends in Theory and Research, ed. Charles D. Spielberger (New York: Academic Press, 1972), p. 273.

[5]Selye, The Stress of Life, op. cit., p. 370.

Because the object of anxiety is frequently intrapsychic and symbolic, anxiety tends to produce distress that is incommensurate with the objective danger and to preclude direct action as a response. Further, as anxiety is related to anticipated future harm, it requires "longer periods to build up" and involves "more complex appraisals."[1]

In summary, fear and anxiety are emotional responses to stressful stimuli, i.e., the perception of danger and threat. However, fear is more likely to be short-lived and to produce coping responses; anxiety is more likely to produce strain. In addition, the response-unavailability characteristic of anxiety tends to produce frustration, which can elicit two other emotions: anger and depression. Anger is functional because it supports direct action and thus relieves anxiety.[2] Seligman stated that anxiety and depression are related in the following way:

> When a man . . . is confronted with a threat or loss, he responds initially with fear; if he learns that the threat is wholly uncontrollable, fear disappears; if he remains uncertain about uncontrollability, fear remains; if he learns or is convinced that the threat is utterly uncontrollable, depression replaces fear.[3]

Having considered the emotional components of stress, the following section examines the behavioral outcomes associated with arousal and the emotions of anxiety, fear, anger, and depression.

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[1]Lazarus and Averill, op. cit., p. 273.

[2]Epstein, op. cit., p. 315.

[3]Seligman, op. cit., pp. 92-93.

Behavioral Components of Stress

In the previous section, it was suggested that some of the emotions of stress are functional: They motivate the individual to take action in the presence of a stressor.[1] Epstein described the process as follows:

> The first step is the perception of danger followed by a state of heightened arousal that provides preparation for flight or fight. Normally, a rapid assessment is made and the arousal is channeled into fear and aggression and a corresponding action.[2]

Arousal, however, is not always adaptive in coping with stress. Janis distinguished among moderate, weak, and excessive arousal in terms of performance effects.[3] Janis pointed out that the relationship between the intensity of arousal and the adequacy of performance forms a curve known as an inverted U-shaped function. The outstanding feature of this type of relationship is that the peak of the curve, which represents the best possible performance that an individual can achieve, will occur at some moderate level of arousal, rather than at either very low or very high levels. Janis found in laboratory experiments that the "organism" remained inattentive to the environment at low levels of motivation; at moderate levels the "organism's" attention increased and its performance became more efficient; at very high levels, the "organism" was in a state of very strong drive, which was disruptive and led to ineffective performance.[4] Janis' laboratory

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[1] Silvan Tomkins, Affect Imagery and Consciousness, vol. 2 (New York: Springer Publishing Co., Inc., 1963), p. 6.

[2] Epstein, op. cit., p. 313.

[3] Janis, op. cit., p. 122.

[4] Ibid., p. 125.

findings are similar to the concepts of underload and overload, which refer to the "inability of the organism's homeostatic mechanisms to maintain an optimum arousal level at high and low levels of stimulus input."[1] Frankenhaeuser, for example, found that conditions of underload and overload, "though opposites in terms of physiological characteristics, may be psychologically similar in that both are perceived as disturbing deviations from the levels of stimulus to which the person is cognitively and emotionally tuned."[2] Frankenhaeuser pointed out that, although humans are highly adaptable and capable of responding to extreme conditions, such adaptation may have after-effects that manifest themselves later as emotional maladjustments, impairment of performance efficiency, or somatic disturbance.[3]

While numerous experimenters have looked at the relationship between changes in performance proficiency and varying degrees of arousal in animals and men, Janis stated that "it still remains an open question whether the inverted U-shaped function describes the relation between certain emotional responses and subsequent reaction to threat cues."[4] He added:

> The inverted-U relation has . . . appeared in the research reports of physiological psychologists, whose discoveries suggest that the cerebral cortex in men and animals may

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[1]Marianne Frankenhaeuser, "Psychoneuroendocrine Approaches to the Study of Stressful Personal-Environment Transactions," in Selye's Guide to Stress Research, ed. Hans Selye (London: Von Nostrand Reinhold Co., 1980), p. 49.

[2]Ibid.

[3]Frankenhaeuser, "Peripheral Catecholamines," op. cit., p. 231.

[4]Janis, op. cit., p. 125.

> function more effectively when the amount of stimulation reaching the cortex from the ascending reticular system is at a moderate level, rather than at a very high or very low level. These neurological considerations make it plausible to assume that the relation between emotional arousal and adaptive reactions to threat cues will prove to be curvilinear. But it still remains an open question whether the inverted U-shaped function does in fact accurately describe the way in which the average person will react to warnings that arouse varying intensities of fear.[1]

According to Janis: "From the accumulated evidence, it appears quite certain, however, that at very high levels of emotional tension, the average person's perceptual and cognitive functions will be severely impaired." A number of empirical investigations have confirmed that intense fear produces indiscriminate vigilance and detrimentally affects a person's perceptions, judgments, and decisions, but the evidence is "fragmentary and inconsistent" regarding "whether a relatively mild threat that arouses a slight or moderate degree of fear has any consistent (adverse) effect on intellectual efficiency." Janis concluded:

> We must await further experiments in which the level of fear arousal is systematically varied from very low to very high to find out whether the relation between cognitive efficiency and level of fear . . . turns out to form an inverted U-shaped curve.[2]

He proposed that an optimum level of fear would be one in which the facilitating effects of fear arousal are most powerful and outweigh the interfering effects.[3]

Lazarus and Averill looked at the effects of anxiety on individual performance: When anxiety is mild, the physiological and psychological arousal that accompanies it may help the individual to

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[1]Ibid. [2]Ibid., pp. 127-29. [3]Ibid., p. 139.

maintain vigilance and even to concretize the danger so that adaptive coping actions can take place; if too intense, however, it may have the opposite effect of narrowing attention to cues that are irrelevant for appropriate solutions.[1]

Stress researchers also have studied the effects of frustration on performance. Frustration is a "condition that results from the interruption of an organism's habitual sequence of acts directed toward the attainment of some goal."[2] The two key components of frustration are a drive, need, or motive and a barrier preventing the motivated person from reaching his or her goal. Child and Waterhouse suggested two different types of interfering effects produced by frustration: The emotional upset evoked by any source of frustration will interfere with the attention, thinking, and planning that produce constructive and imaginative performance; in addition, frustration tends to distract from the pursuit and completion of the original task.[3] The findings of Child and Waterhouse contrast with the idea that frustration results in more vigorous, goal-directed action. If frustration persists, either anger or depression eventually will be experienced. Anger may lead to the circumvention or elimination of the obstacles that are producing frustration by direct action against them. However, when anger reaches an intense level, actions tend to become disorganized and impulsive and resemble the

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[1]Lazarus and Averill, op. cit., p. 253.

[2]Janis, op. cit., p. 151.

[3]I. L. Child and I. K. Waterhouse, "Frustration and the Quality of Performance," Psychological Review 59 (1952): 351-62.

indiscriminate vigilance that occurs at very high levels of fear.[1]

Seligman showed that, when faced with noxious events that are uncontrollable, the motive to respond and the ability to perceive success and to learn that responding works are drastically undermined.[2] Also, uncontrollability results in emotional disturbance, primarily anxiety and depression. Seligman termed helplessness the psychological state that results when events are uncontrollable. According to him, an event is uncontrollable when the outcome is independent of voluntary responses.[3] The two components of helplessness, said Seligman, are information about the contingency and cognitive representations of the contingency and behavior. Seligman stated:

> Man . . . must begin with information about the contingency of outcome upon response. This information is a property of the organism's environment, not a property of the perceiver. . . . The information about the contingency must be processed and transformed into a cognitive representation of the contingency, . . . the expectation that responding and an outcome are independent. . . . It is the expectation, not the objective conditions of controllability, that is the crucial determinant of helplessness.[4]

Seligman found that, when animals and men learn that a stressor is uncontrollable, a reaction of passivity, giving up, and withdrawal usually occurs.[5]

In summary, numerous investigators have concluded that the emotions of the stress state, fear, anxiety, anger, and depression,

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[1]Janis, op. cit., p. 148.

[2]Seligman, op. cit., p. 44.

[3]Ibid., p. 9. [4]Ibid., pp. 47-49. [5]Ibid., p. 172.

can adversely affect task performance. The question that remains unsettled is the level of emotional intensity that must be present before performance is impaired and whether or not the inverted U-shaped curve describes the relation between the intensity of the emotions of the stress state and performance effects.

Control as a Mediator of Stress

In the section on the emotions of the stress state, it was observed that fear and anger differ from anxiety in terms of response availability. An individual can take direct action in response to a stressor that evokes fear and anger. In contrast, stressors that evoke anxiety usually are symbolic and intrapsychic and, consequently, are not available for direct action. There are times, however, when an individual either wants to flee or fight but external circumstances prevent him or her from doing so or when an individual perceives that the available responses will have little to no effect on removing the stressor. In these circumstances, as in an anxiety state,[1] the individual experiences a feeling of absence of control or helplessness.

Averill distinguished among three types of personal control: behavioral, cognitive, and decisional.[2] According to him, each type of control is related to stress in a "complex fashion," though, generally, feelings of uncontrollability are positively related to

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[1]Cattell stated that anxiety is closely related to helplessness; in Lazarus and Averill, op. cit., p. 250.

[2]James R. Averill, "Personal Control Over Aversive Stimuli and Its Relationship to Stress," Psychological Bulletin 80 (1975): 286.

the stress state. According to Averill, there are, however, situations in which control over events can be stress-inducing; an example is the individual who wishes to remain dependent and to abdicate control to another. For this reason, Averill stated that the stress-inducing or stress-reducing properties of personal control depend on the meaning of the control response for the individual.[1] Averill defined behavioral control as "the availability of a response which may directly influence or modify the objective characteristics of a threatening event." This includes having control over who administers the noxious stimulus, how it is administered, and when it will occur. In other cases, behavioral control implies preventing the noxious stimulus from occurring, terminating it prematurely, or modifying it in some way by direct action. Therefore, Averill concluded that behavioral control includes "regulated administration and stimulus modification." Averill stated that cognitive control is "the way in which an event is interpreted or appraised or incorporated into a cognitive plan" and "the processing of potentially threatening information in such a manner as to reduce net long-term stress and/or psychic cost of adaptation."[2] Averill distinguished between two steps in cognitive control: information gain and appraisal. An example of information gain is having a warning signal prior to an aversive stimulus. Through appraisal an individual imposes meaning on events. He stated:

> As it relates to personal control, the concept resembles Kelly's notion of the personal construct. Kelly viewed man as an

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[1]Ibid., p. 301. [2]Ibid., pp. 287-94.

> incipient scientist whose ultimate aim is to predict and control events. Such prediction and control is achieved by abstracting from events certain features and weaving the abstractions into a system of constructs which lend meaning to the separate events.[1]

Averill stated that there are different types of appraisers: Sensitizers focus attention on threatening events and search for clues regarding potential harm; deniers deny the presence of danger. Thus, the relationship between information gain and appraisal, as presented by Averill, is particularly complex. For example, on the one hand information as a form of personal control reduces the impact of a stressor for sensitizers; on the other hand, information gain may be counterproductive for deniers. Averill concluded that "the type of information a person receives about an impending danger may interact in a generally predictable fashion . . . with [the individual's] characteristic style of [psychological] defense."[2] With regard to decisional control, Averill noted that an experiment in which subjects had both decisional and behavioral control, i.e., when the condition of escape was possible and the subject felt free to respond or not, was as stress-inducing as its opposite: no choice and no escape. However, both behavioral and decisional control were stress-reducing for the same subjects when separately available. Further, in this experiment no escape or absence of behavioral control was more stress-inducing than the absence of either decisional or cognitive control.[3]

Helplessness is perceived uncontrollability. Many laboratory and field studies have led researchers to conclude that helplessness regarding undesirable events is highly correlated with strain.

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[1]Ibid., p. 295. [2]Ibid., p. 296. [3]Ibid., p. 298.

Johnson and Sarason found that significant correlations between change and depression and anxiety were found only in subjects who were external in their locus-of-control orientation.[1] Locus of control reflects the extent to which individuals believe themselves capable of exerting personal control over environmental events; externals, for example, believe that events are out of their control. Streiner et al. also found that uncontrollable events correlated significantly with strain.[2] Bettelheim stated that the one factor that makes an experience extreme is its inescapability.[3] Janis found that, faced with the threat of shock, the greatest degree of emotional disturbance results when the subject is unable to predict the time of the shock and is given no opportunity to control its onset or termination. Predictability provides a "safety signal" or time when the subject can relax. Janis noted that when control is present, prediction is also present, but he found that control adds anxiety relief over and above predictability.[4] Grinker and Spiegel found that trauma or an uncontrollable adverse event produced a breakdown of invulnerability feelings accompanied by depression and apathy.[5] Frankenhaeuser confirmed in her experiments that the possibility of exercising situational control is a major determinant of the stressfulness of

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[1]Johnson and Sarason, op. cit., p. 205.

[2]Streiner et al., op. cit., p. 34.

[3]Bruno Bettelheim, The Empty Fortress (New York: The Free Press, 1967), p. 7.

[4]Janis, op. cit., p. 67.

[5]Ibid., pp. 69-71.

person-environment transactions; that the pituitary-adrenal-cortical system is highly susceptible to all aspects of control (in terms of the increased secretions associated with the stress state);[1] and that adrenaline excretion decreases when the individual gains better control over an experimentally induced stressor.[2] Finally, Seligman stated that in parasympathetic death the crucial factors are an uncontrollable stressor and a reaction of passivity-enhanced susceptibility to death, and that helplessness seems to make people "more vulnerable to the pathogens that are always around us."[3]

In summary, helplessness or perceived uncontrollability occurs when an individual is either unable to take action against a stressor or concludes that the outcome of a stress-inducing situation is unrelated to his or her actions. Uncontrollability usually exacerbates the stress state and is more likely to produce strain, whereas controllability usually alleviates the stress state. Thus, in most cases the presence of control is a moderator of the stress state.

Cognitive and Personality Factors as Mediators of Stress

Previously, it was suggested that a stressor is a symbol or signal of something that is apprised to be dangerous and threatening. According to Lazarus, at the cognitive level, or consciously, an individual appraises a potentially stress-inducing stimulus in three

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[1]Frankenhaeuser, "Psychoneuroendocrine Approaches," op. cit., p. 52.

[2]Frankenhaeuser, "Peripheral Catecholamines," op. cit., p. 214.

[3]Seligman, op. cit., p. 172.

stages: primary appraisal, secondary appraisal, and reappraisal. He stated that such "appraisal and reappraisal activities are in the service of attempts by the person to know where he stands in any situation and to maintain mastery or control over it."[1] Appraisal describes the cognitive processes mediating between the environmental situation and the individual's emotional reaction to it. The issue to be judged in primary appraisal is whether or not a danger or threat has been signaled. Lazarus concluded that "the more advanced the organism phylogenetically the more room for flexible control of emotional states and behavior and the more cognitive processes are involved in such control."[2]

According to Lazarus, every appraisal is a function of two broad classes of variables: situational and dispositional. Situational variables refer to the entire context in which a stimulus is embedded, i.e., any environmental factors that influence the processing of information. Dispositional variables are the combined result of a person's biological and cultural heritage and personal history and refer to the personality traits, beliefs, attitudes, and coping resources that an individual brings to the situation.[3] This explanation of the appraisal process explains why, given idiosyncratic situational and dispositional attributes, an individual who encounters a

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[1]Richard S. Lazarus, "The Self-Regulation of Emotion," in Emotions: Their Parameters and Measurement, ed. Lennart Levi (New York: Raven Press, 1975), pp. 47-48.

[2]Ibid., p. 50.

[3]Ibid., p. 59.

stimulus with characteristics that would constitute a threat to most people will not experience it as such.

In terms of dispositional variables, recent studies have attempted to identify the personality factors that provide resistance to stressors. Antonovsky proposed that "homeostatic flexibility" may be such a personality factor. Homeostatic flexibility means the "ability to emphasize alternative, unthreatened social roles in one's identity, to accept alternative, unthreatened values as legitimate and to recover one's balance and continue daily activities as quickly as possible [when under stress]."[1] Garrity et al. found that three personality factors affect the susceptibility to health breakdown after life change. Persons characterized by social conformity are less at risk; persons characterized by liberal intellectualism and emotional sensitivity are more at risk.[2] Kobasa, Maddi, and Courington identified what they termed a "hardiness factor" that protects against the illness-provoking effects of stress. Hardy persons possess three general characteristics: the belief that they can control or influence the events of their experience, the ability to feel deeply involved and committed to the activities in their lives, and

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[1]Anton Antonovsky, "Conceptual and Methodological Problems in the Study of Resistance Resources and Stressful Life Events," in Stressful Life Events: Their Nature and Effect, ed. Barbara Snell Dohrenwend and Bruce P. Dohrenwend (New York: John Wiley and Sons, 1974), p. 3.

[2]Thomas F. Garrity, Grant W. Somes, and Martin B. Marx, "Personality Factors in Resistance to Illness After Recent Life Changes," Journal of Psychosomatic Research 21 (1977): 24.

the anticipation of change as an exciting challenge to further development.[1]

Many persons who encounter a stressor, however, initially respond to it as threatening and then engage in the second step in the appraisal process described by Lazarus, i.e., secondary appraisal. Secondary appraisal is a judgment about the forms of coping available for mastering anticipated harm. Lazarus stated that coping outcomes fall into two classes: direct actions or overt responses and intrapsychic processes or defense mechanisms.[2] Coping activity may succeed in altering the situation so that it no longer appears threatening either "by actually changing the person-environment relation or by somehow convincing the person experiencing the threat that he is no longer in danger."[3] When no direct action can be taken to alter the person-environment situation, the intrapsychic mode of coping, i.e., the defense mechanism employed, depends on how the situation is construed. Vaillant distinguished among mature, immature, and neurotic defenses used by individuals in a stress state. According to him, mature defenses are altruism, suppression, anticipation, humour, and sublimation; immature defenses are fantasy, projection, passive aggression, hypochondriasis, and acting out; neurotic defenses are intellectualization, repression, reaction formation, displacement,

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[1]Suzanne C. Kobasa, Salvatore R. Maddi, and Sheila Courington, "Personality and Constitution as Mediators in the Stress-Illness Relationship," Journal of Health and Social Behavior 22 (1981): 368-69.

[2]Lazarus and Averill, op. cit., p. 242.

[3]Ibid.

and dissociation.[1] Norma Haan also distinguished between adaptive and maladaptive defensive styles: She called the former coping and the latter defensive.[2] Vaillant stated that the crucial difference between mature and neurotic defenses is that the individual using mature defenses knows how he or she feels but responds "stoically."[3] In contrast, immature and neurotic defenses distort or deny reality. For this reason, Lazarus et al. pointed out that, when immature and neurotic defenses are used in coping with a stressor, the results may be unsatisfactory, i.e., may distort or deny reality. He concluded, however, that even mature defenses used to cope with stressors can backfire, stating: "At present it is still an open question whether health, morale or social functioning are harmed by or benefit from an accent on the positive in the face of demanding or unfavorable life conditions."[4] Further, the use of defensive techniques to cope with stressors may be responsible for what some observers term the "dissociation" of subjective feelings, visceral feelings, and overt behavior.[5] MacLean referred to the "potential schizophysiology of limbic and neocortical systems"[6] and suggested that this situation

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[1]George E. Vaillant, "Natural History of Male Psychological Health," Archives of General Psychiatry 33 (1976): 536.

[2]Ibid., p. 542. [3]Ibid., p. 540.

[4]Lazarus et al., op. cit., p. 93.

[5]John W. Mason, "Emotion as Reflected in Patterns of Endocrine Integration," in Emotions: Their Parameters and Measurement, ed. Lennart Levi (New York: Raven Press, 1975), p. 148.

[6]MacLean, op. cit., p. 81.

may account for conflict between "what we affectively feel and what we know."[1] Mason found in experiments that

> The overt expression of affective states was sometimes misleading. In some subjects, for example, those characterized as suffering in silence, . . . high chronic mean basal corticosteroid levels and spiking elevations during acutely stressful events belied the stoical, unruffled behavioral style in which external expressions of emotional distress were characteristically missing.[2]

Thus far, primary appraisal, an initial judgment about whether or not a threat is present, and secondary appraisal, a judgment about the forms of coping available for mastering anticipated harm, have been described. The last step in the appraisal process is reappraisal. According to Lazarus, reappraisal is a changed interpretation of the plight of the person as a result of new information, further reflection, or feedback from one's actions.[3] Lazarus distinguished between two forms of reappraisal: One is a result of objective information and conforms to reality; the other is a defensive reappraisal in which the threat is reduced through a defense mechanism used when the individual feels anxious.[4]

Social Support as a Mediator of Stress

Because the correlation between stressful life events and physiological and psychological illness symptoms, though dependable, is low, researchers have looked for factors that might moderate the effects of stressors. In various studies, two factors have been

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[1]Mason, op. cit., p. 147. [2]Ibid.

[3]Lazarus and Averill, op. cit., p. 252.

[4]Ibid.

identified as moderators: the individual's coping abilities and available social supports.[1] The previous section looked at the mediating role of cognitive and personality factors in coping with stressors. This section discusses the stress-buffering role of social support.

Social support is defined in several ways. Cobb stated that social support is "information leading the subject to believe that he is cared for and loved . . . , esteemed, valued . . . and [that he] belongs to a network of communication and mutual obligations."[2] Lin, Dean, and Ensel defined social support as "support accessible to an individual through social ties to other individuals, groups and the larger community."[3] Toldorf saw support as "any action or behavior that functions to assist a person in meeting his personal goals or in dealing with the demands of any particular situation."[4] Marsella and Snyder called support "any object, event or process that is capable of influencing or mediating a stressor or stress."[5] Taken as a whole, these conceptions of social support imply that it is

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[1]Gavin Andrews et al., "Life Event Stress, Social Support, Coping Style and Risk of Psychological Impairment," The Journal of Nervous and Mental Disease 166 (1978): 308.

[2]Sidney Cobb, "Social Support as a Moderator of Life Stress," Psychosomatic Medicine 38 (1976): 300.

[3]Nan Lin, Alfred Dean, and Walter Ensel, "Social Support Scales: A Methodological Note," Schizophrenia Bulletin 7 (1981): 73.

[4]Christopher Tolsdorf, "Social Networks, Support and Coping: An Exploratory Study," Family Process 15 (1976): 410.

[5]Marsella and Snyder, op. cit., p. 156.

something positive that depends on ties with others, provides the individual with both emotional and instrumental benefits, and moderates stress.

The aspect of social support assumed to moderate stress is the coping resources that it provides, i.e., the expressive and instrumental resources that it provides. Foa and Foa described these interpersonal resources as follows: money, love, service, information, status, and goods.[1] Schachter concluded that two different motives might give rise to an increased need for affiliation: the need to elaborate one's own feelings and emotional symptoms by comparing them with those displayed by others and the need to obtain reassurance by being in the presence of others who will be supportive because they are in a similar predicament.[2]

Several epidemiological studies have confirmed that social support moderates stressors. Cobb found that social support can protect people in crisis from a variety of pathological physiological and psychological states and may accelerate recovery from them.[3] Nuckolls, Cassel, and Kaplan found that pregnant women with favorable psychosocial assets had fewer complications in pregnancy.[4] Hirsch stated that supportive interpersonal relationships, work environments,

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[1]Alvin Wolfe, "Stress, Social Support and Schizophrenia," Schizophrenia Bulletin 7 (1981): 176.

[2]Janis, op. cit., p. 93.

[3]Cobb, op. cit., p. 300.

[4]Katherine B. Nuckolls, John Cassel, and Berton H. Kaplan, "Psychosocial Assets, Life Crisis and the Prognosis of Pregnancy," American Journal of Epidemiology 95 (1972): 431.

and organizational affiliations are associated with better mental and physical health.[1] Miller and Ingham found that "those that have lesser degrees of close and diffuse support tend . . . to be more vulnerable to life stresses."[2] Lin, Dean, and Ensel concluded that social support "serves as a buffer against the potential effects of stressful events."[3] Cassel and Henderson have suggested that social support has a powerful effect as a moderator of the deleterious effects of stress,[4] and Miller showed that social support can counteract fear.[5]

Despite all the evidence above and other studies with similar conclusions, Andrews et al. cautioned that it is "the quality of the emotional relationships rather than the quantity of help available that is the principal determinant of effective crisis support."[6] Handy noted that the family and other forms of social support can be either a source of stress or a way of alleviating it.[7] Janis said

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[1]Barton J. Hirsch, "Coping and Adaptation in High Risk Populations: Toward an Integrative Model," Schizophrenia Bulletin 7 (1981): 165.

[2]P. McC. Miller and J. G. Ingham, "Friends, Confidants and Symptoms," Social Psychiatry 11 (1976): 57.

[3]Lin, Dean, and Ensel, op. cit., p. 74.

[4]Cassel, op. cit., pp. 114-21; A. S. Henderson, "The Social Network, Support and Neurosis: The Function of Attachment in Adult Life," British Journal of Psychiatry 131 (1977): 187.

[5]Miller, in Selye, Selye's Guide to Stress Research, op. cit. p. 135.

[6]Andrews et al., op. cit., p. 314.

[7]Charles Handy, "The Family: Help or Hindrence?" in Stress at Work, ed. Gary Cooper and Roy Payne (New York: John Wiley and Sons, 1978), p. 107.

that not all companions are equally desirable. For example, he found that in a high state of fear, persons prefer companions who provide fear reduction to those who are themselves in a high state of fear.[1] Finally, Hammer noted that "having support may be one function of a set of social conditions. As such, it may prove misleading if we are not alert to the complementary impact of restraint, opposition and demandingness . . . within these social connections."[2]

To clarify the role of social support in stress, researchers have turned to the concept of social network, which has neutral connotations, and have examined the qualities of social networks that seem to be stress-reducing. Social networks describe the direct and indirect ties linking a group of individuals over certain defined criteria such as kinship and friendship and provide the structural framework within which support may or may not be accessible to an individual. Social networks are neutral unlike support, which implies psychosocial benefits, and may be health- or pathology-promoting depending on their composition and nature. Comparisons by Pattison, Llamas, and Hurd of social networks that provided stress-buffering effects with those that did not revealed that the former are readily mobilized to respond when members are under stress and provide a fairly continuous flow of positive emotional support and ready instrumental assistance.[3] In addition, Tolsdorf found that

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[1]Janis, op. cit., p. 93.

[2]Muriel Hammer, "Social Supports, Social Networks and Schizophrenia," Schizophrenia Bulletin 7 (1981): 47.

[3]E. Mansell Pattison, Robert Llamas, and Gary Hurd, "Social Network Mediation of Anxiety," Psychiatric Annals 9 (1979): 66.

individuals in a support-providing social network perceive other network members as supportive, empathic, receptive, and understanding; this perception, according to Tolsdorf, helps to maintain the network and facilitates its being turned to in times of stress.[1] In contrast, less-supportive networks have fewer members, ties limited to the nuclear family alone, fewer interactions among members, and frequent weak and negative emotional interactions. Individuals in these types of networks understandably have a negative orientation that interferes with their drawing upon network resources for coping in times of stress.[2]

In summary, many epidemiological studies have associated social support with a stress-buffering role and have measured social support by the degree of social integration among members. Having discovered, however, that social ties may be stress-inducing or -maintaining as well as stress-reducing, researchers recently have identified the structural and functional properties of social networks that seem to provide support to subjects during stress.

Job Loss and Stress

The final section of the literature review examines the relationship between job loss and stress and strain. As mentioned in Chapter I, Holmes and Rahe placed being fired from a job eighth on the Social Readjustment Rating Scale and gave it a stress value of 47 out of a possible 100 points. In Paykel's scale of undesirable

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[1] Tolsdorf, op. cit., p. 416. [2] Ibid.

life events, being fired is also ranked eighth in relation to 61 other undesirable life events. Both of these scales are based on the viewpoints of judges regarding the stress-inducing attributes of life events. In terms of the situation at MSU, Lazarus and Averill pointed out that anticipation of a stressor carries "most of the burden of stress," particularly when the anticipation is of long duration.[1] Gore stated in her study of unemployment that job loss is a "sociologically significant stressful experience with a number of documented health effects" and "an unambiguously negative event . . . which is [also] the stimulus for other concurrent life stresses."[2]

A number of studies have examined the physiological and psychological effects of job loss. Gore looked at actual physiological changes associated with the stress state during various stages of job loss: anticipation, termination, readjustment (at six months) and 24 months later. She used control groups (no job loss) and terminees (job loss), comparing them on a number of variables other than employment status that might account for differences in health measurements. She found at the anticipation and termination stages that the terminees with minimal social support had elevated illness-reporting and serum cholesterol levels (a sign of stress).[3] Cobb's

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[1]Lazarus and Averill, op. cit., p. 271.

[2]Susan Gore, "The Effects of Social Support in Moderating the Health Consequences of Unemployment," Journal of Health and Social Behavior 19 (1978): 159.

[3]Ibid., p. 162.

prospective study of unemployed men, who also were compared with controls, had similar findings, i.e., elevated levels of serum cholesterol and norepinephrine (clinically associated with stress) during the anticipation and termination stages and 12 months later.[1]

With regard to the psychological effects of anticipated job loss, any of the emotional components of the stress state might be present, i.e., fear, anxiety, anger, or depression. Indeed, Brown and Tirril found in their study of depressed women that having a full- or part-time job was one of three factors protecting against depression precipitated by events involving loss or disappointment.[2]

Many of the studies about the effects of job loss have looked at the moderating role of personality disposition, coping skills, and social support. In a study of occupational stressors, Pearlin and Schooler found that the most effective types of coping involve psychological resources that permit the manipulation of goals and values because "the evidence indicates that it is psychological characteristics that are most helpful in sustaining people facing strains arising out of conditions over which they have little or no direct control."[3] According to them, coping with occupational stressors requires the following:

> The substitution of rewards, . . . the devaluation of the intrinsic rewards of work and a valuation of extrinsic rewards,

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[1]Sidney Cobb, "Physiological Changes in Men Whose Jobs Were Abolished," Journal of Psychosomatic Research 18 (1974): 259.

[2]George W. Brown and Harris Tirril, The Social Origins of Depression (New York: The Free Press, 1978).

[3]Pearlin and Schooler, op. cit., pp. 11-13.

> such as pay and fringe benefits. People seek to control stress in occupations, though without much success, by keeping work itself in a place secondary in importance. . . . For matters of . . . work . . . stress is less likely to result when people disengage themselves from involvement. . . . In occupations, finally, stress hinges much more closely on psychological resources than on specific resources, although . . . neither has an appreciable part in buffering the stressful effects of job strains. . . . The problems arising in the relatively impersonal milieu of occupation are less amenable to coping--either by the weight of one's personality or by the weight of . . . response patterns--than are problems occurring elsewhere.[1]

Concerning the stress-buffering role of social support, as mentioned earlier, Gore found that unsupported terminees suffered more severe physiological symptoms and did not return to baseline pre-stress physiological levels as quickly as controls with social supports.[2] Cobb also found differences in physiological stress manifestations among subjects without social supports.[3] The data in Figures 2.4 and 2.5 depict Cobb's findings.

In contrast to the above findings, Pinneau's studies found that social support is "not associated with an actual reduction in physiological strain and that there was little evidence that support buffered the effects of stress on either psychological or physiological strain."[4]

In conclusion, prospective studies have shown that anticipation of job loss produces the physiological changes associated with the stress state. The empirical evidence on psychological effects has indicated that maintaining a job can protect against the development of depression in the face of other life stressors. The degree

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[1]Ibid. [2]Gore, op. cit., p. 162.

[3]Cobb, op. cit., pp. 253-56. [4]Gore, op. cit., p. 158.

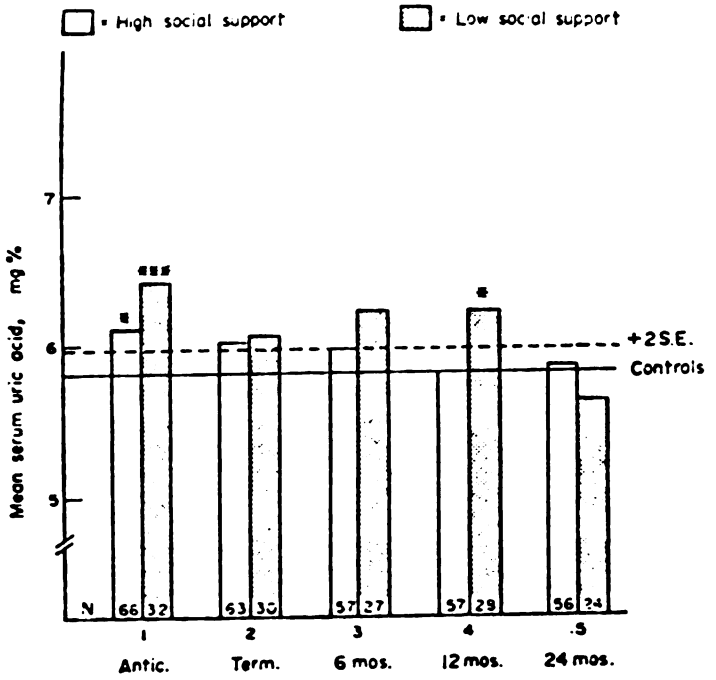

Figure 2.4.--Physiologic changes in men whose jobs were abolished. (From Sidney Cobb, "Physiologic Changes in Men Whose Jobs Were Abolished," Journal of Psychosomatic Research 18 (1974): 255.)

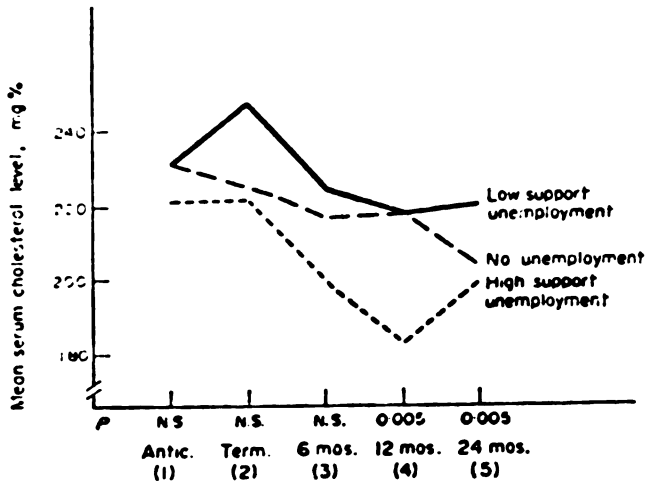

Figure 2.5.--Serum cholesterol in mg/100 ml by phase and employment status and level of social support. (From Sidney Cobb, "Physiologic Changes in Men Whose Jobs Were Abolished," Journal of Psychosomatic Research 18 (1974): 256.)

and duration of any of the psychological effects of job loss will depend, of course, on dispositional and situational factors. It has been found that direct coping techniques are less easily available and useful in stressful occupational environments because of lack of control over events. Finally, the evidence on the stress-moderating role of social support for those facing job loss is contradictory: At least two studies found that having social support moderates stress; one study reached the conclusion that social support had little buffering effect on either stress or strain.

CHAPTER III

DESIGN OF THE STUDY

In this chapter are described the sample for the study, the questionnaire, research design, analysis strategy, and hypotheses to be tested.

Sample

The persons surveyed in the questionnaire are Michigan State University faculty, identified by department or college in the 1981 MSU Faculty and Staff Directory. The departments and colleges were selected on the basis of whether or not they had been identified by the proposals issued by the Provost's office on March 9, 1981 (Preliminary Coordinated Proposals of Deans, Provost and President)[1] and March 19, 1981 (Revised Preliminary Coordinated Proposal of Deans, Provost and President),[2] which indicated departments and in some cases colleges scheduled for no layoffs, some layoffs, and dissolution. Departments were called a priori low change (i.e., low stress) if no layoffs were planned; departments were called a priori moderate change (i.e., moderate stress) if some layoffs were planned;

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[1]Office of the Provost, "Preliminary Coordinated Proposals, March 9" (Michigan State University: 63, 1981), pp. 1-63.

[2]Office of the Provost, "Revised Preliminary Coordinated Proposal, March 19" (Michigan State University: 173, 1981), pp. 1-173.

and departments and colleges were called a priori high change (i.e., high stress) if dissolution was proposed. Departments designated as a priori low, moderate, and high groups in this design were as follows:

Low: Accounting and Financial Administration, Agricultural Economics, Communications, Electrical Engineering, and Systems Science

Moderate: Teaching and Professional Development, Natural Science, Human Environment and Design, and History

High: Astronomy and Astrophysics, Racial and Ethnic Studies, Urban and Metropolitan Studies, Social Work, and the College of Nursing

Two hundred faculty members were chosen from the abovementioned departments and mailed questionnaires in October 1981. (See Appendix C.) One hundred thirteen completed questionnaires were returned by the end of November 1981. Of these, 84 were used in this study. (See Appendix D for sample procedure and final sample composition.) The others were eliminated from the study either because the respondents indicated that they experienced life changes in the previous two years that were more stress-inducing than the threat of the loss of a job, according to the Social Readjustment Scale developed by Holmes and Rahe and the Undesirable Life Events Scale of Paykel, Prusoff, and Uhlenhuth (Appendices A and B), or they indicated that they were on leave from MSU or had left MSU during the period covered in the study, i.e., academic years 1979-80 and 1980-81.

Questionnaire

A questionnaire was developed to measure the variables social support and occupationally locked-in (mediating variables), stress and strain, and productivity. A copy of the mailed questionnaire

appears in Appendix C. In addition, demographic data were collected to indicate age of respondent, marital status, employment of spouse, and the number and ages of children. Thirteen respondents' ages ranged from 25 to 35 (15.5%), 34 respondents' ages ranged from 36 to 45 (40.5%), 26 respondents' ages ranged from 46 to 55 (31%), and 11 respondents' ages ranged from 56 to 65 (13.1%). Sixty-three percent of the respondents were married; 56% had children; 42% had children living with them; 67.7% had spouses employed full time, and 22.2% had spouses employed part time.

Questions used to measure social support were derived from a number of scales developed by other researchers interested in determining social support. Specifically, questions were asked to ascertain social support from three perspectives: structure, function, and satisfaction. Questions looking at structure dealt with the size of the respondent's network (Questions 5-7) and the frequency of interaction with the network (Questions 10-16). Functional questions looked at the support the subject expected from the various networks (Questions 17-20). Satisfaction questions dealt with the subject's satisfaction with community and neighborhood (Questions 8 and 9).

Specifically, to find out about direct crisis support expected from known others, Questions 17-20 asked the subject how much assistance he or she felt could be relied on from family, friends, and colleagues in a crisis. Questions 10-16 inquired about the amount of contact with these sources. This line of inquiry was used by Andrews et al., Tolsdorf, Lowenthal and Haven, Medalie and Goldbourt,

and Miller, Ingham, and Davidson in their studies of social support.[1] Andrews et al. asked respondents to imagine that they had a family to look after and then asked the following related questions:

> In an emergency do you have relatives who would look after your family for a week?
>
> In an emergency do you have friends who would look after your family for a week?
>
> In an emergency do you have neighbors who would look after your family for a week?
>
> If everything went badly, how many people would you turn to for real comfort and support?

Tolsdorf collected data on the subjects' attitudes, beliefs, and expectations toward their networks as to the role network members could play in helping them to cope with life stresses. Lowenthal and Haven asked respondents the following: "Is there someone you confided in or talked to about yourself or your problems?" Medalie and Goldbourt looked at the effects of a spouse not listening or opposing the respondent when a problem was discussed. Miller, Ingham, and Davidson asked whether the source of support lived close by and was reasonably available.

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[1] Gavin Andrews et al., "Life Event Stress, Social Support, Coping Style and Risk of Psychological Impairment," The Journal of Nervous and Mental Disease 166 (1978): 310; Christopher Tolsdorf, "Social Networks, Support and Coping: An Exploratory Study," Family Process 15 (1976): 408-10; M. Lowenthal and C. Haven, "Interaction and Adaptation: Intimacy as a Critical Variable," American Sociological Review 33 (1968): 20-30; J. Medalie and U. Goldbourt, "Angina Pectoris Among 10,000 Men: Psychosocial and Other Risk Factors," American Journal of Medicine 60 (1976): 919; P. McC. Miller, J. H. Ingham, and S. Davidson, "Life Events, Symptoms and Social Support," Journal of Psychosomatic Research 20 (1976): 516.

To find out about indirect sources of support from interaction within neighborhoods and social organizations, subjects were asked if they were members of a religious group, a neighborhood association, and a professional association and the extent of participation in these groups. Questions 8 and 9 inquired about the respondent's satisfaction with neighborhood and community. This line of inquiry was used by Andrews et al.; Miller, Ingham, and Davidson; and Lin et al. in their studies of social support.[1] Miller, Ingham, and Davidson asked subjects whether they felt they knew many people in their neighborhood or at work. Andrews et al. asked respondents how many years they had lived in the neighborhood and how many good friends presently lived in the neighborhood; in addition, they asked whether or not they had participated in any of the following activities within a specified time period: church service, social club, recreation group, service club, and special-interest group. Lin et al. asked as follows: "On the whole, how satisfied are you with this neighborhood?" and "On the whole, how satisfied are you living here in this community?"

To find out about being occupationally locked-in, Questions 32-34 asked the subjects to indicate whether or not they felt that they could move from a current job to another one at MSU; felt that they could move from a current job to one elsewhere; and felt that they were presently qualified for a position other than the job

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[1]Andrews et al., op. cit., p. 310; Miller, Ingham, and Davidson, op. cit., p. 516; Nan Lin et al., "Social Support, Stressful Life Events, and Illness, A Model and an Empirical Test," Journal of Health and Social Behavior 20 (1979): 113.

currently held. This line of inquiry was used to indicate a subject's feelings of being locked-in occupationally in the study done by Burke.[1]

To find out about feelings of stress and strain, subjects were asked in Questions 22 and 23 if they found the work situation stressful at MSU in 1980-81 and whether or not they experienced strain in response to this stress. Both stress and strain were defined in the questionnaire.

Productivity was defined in terms of journal articles completed and submitted for publication in academic years 1979-80 and 1980-81, books completed in both academic years, and research proposals submitted in both academic years. This information was asked in Questions 24-31.

Before mailing the questionnaire, a pilot questionnaire was mailed to ten faculty with a cover letter explaining the study and requesting recommendations regarding the format and questions appearing in the questionnaire. In addition, three faculty members in the Department of Education who have expertise in questionnaire development were independently consulted.

In terms of the reliability and validity of the instrument, there are several factors that would support an assumption of both face reliability and validity. First, the pilot study specifically asked for recommendations and corrections; nine out of ten of these were returned with suggestions. Second, many of the measures used

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[1]Ronald J. Burke, "Occupational Locking-In: Some Empirical Findings" (paper presented at the Annual Meeting of the Western Psychological Association, San Diego, California, April 5-8, 1979).

had already been tested by other researchers in their studies of stressful life events and social support. Third, the productivity reports can be cross-checked by using annual reports from the various departments. Fifth, there was a high level of identification and involvement by the respondents with the aims of the survey. This should have kept capricious responses to questions at a minimum. As far as the measures of stress and strain are concerned, these are perceived or subjective measures. More precise information would have required that both psychological and physiological tests be administered to subjects. One school of thought in stress research, however, is that a subject's understanding of the situation determines the level of stress and strain experienced.

Research Design

The research design includes a research strategy that tests the "events" and "cognitive" theories of stress to determine which one might best fit the stress model used in this study.

Dependent and Independent Variables

The dependent or criterion variable in this study was the difference in productivity from academic year 1979-80 to academic year 1980-81. There were four indicators of productivity for these respective years: journal articles completed and submitted, refereed journal articles completed and submitted, books completed, and research proposals submitted.

To determine whether or not the sum of these four indicators of productivity would reflect an accurate picture of faculty

productivity for each year, a correlation matrix of each indicator and the sum of the indicators for the 1979-80 year, for the 1980-81 year, and the sum over both years was produced. (See Appendix E.) The results show that the sum score for each of the years in question is, for the most part, a homogeneous combination of the individual factors. Although number of books completed did not correlate as highly as the other factors, there was still a positive contribution of this factor. Therefore, it was decided to include it in the sum score rather than to consider it as a separate independent variable.

Operationally defined, the dependent variable in this study was the sum of journal articles, books, and research proposals produced in the 1979-80 academic year subtracted from the sum produced for the 1980-81 academic year. A positive value of productivity differences indicated that there was an increase of productivity from 1979-80 to 1980-81; a zero value meant that there was no change in productivity from 1979-80 to 1980-81; and a negative value meant that there was a decrease in productivity from one year to the next.

The independent or predictor variables for productivity were measures of stress, social support, and feelings of being locked into a job. With regard to stress, the data were examined in two ways. First, a priori groups were designated as low-, moderate-, and high-change (stress) departments. As mentioned previously, departments were placed in one of these three classifications depending on the extent of layoffs proposed for each department in the report issued from the Provost's office in March 1981. For the a priori groups, stress was coded as follows: low-change (stress)

departments = 1, moderate-change (stress) departments = 2, and high-change (stress) departments = 3. Second, empirical stress groups were identified based on the actual stress reported by individuals in the questionnaires that were returned. For the empirical groups, stress was measured by the report of experienced stress at work in Question 22: a lot of stress = 1, some stress = 2, a little stress = 3, and none = 4.

Social support indicators (a lot = 1, some = 2, a little = 3, and none = 4) included the following: extent of religious-group participation (Question 5); neighborhood-association participation (Question 6); professional-group participation (Question 7); satisfaction with neighborhood (Question 8); satisfaction with community (Question 9); extent of contact with extended family (Questions 10, 11, and 12), with immediate family (Question 13), and with friends (Questions 14, 15, and 16); and assistance from immediate family (Question 17), extended family (Question 18), friends (Question 19), and department colleagues (Question 20).

Indicators of feeling locked into a job were definitely locked-in = 1 and definitely not locked-in = 4. These were measured in Questions 32, 33, and 34.

Analysis Strategy

In Chapter I, two theories about stress were discussed. The first, an "events" theory, states that stress results from life events whose advent is either indicative of or requires significant change in the ongoing life pattern of the individual. The second, a

"cognitive" theory, states that no stimulus is a stressor to all people: A stressor must be perceived or appraised as such by the individual.

The analysis strategy in this research considers both theories and subsequently analyzes the data in terms of the theoretical approach that seems most valid. If life events or change per se determined the degree of stress experienced by faculty, a priori groups and empirical groups will be identical in their experience of stress. The first test in the research strategy, therefore, was to determine if the faculty surveyed reported stress as expected, based on the amount of change, i.e., threat, their respective departments faced. If a priori groups reported stress in the same way as empirical groups, i.e., if a priori and reported stress were significantly related, the next step was to test the research model for the a priori groups using regression analysis.

The statistical test appropriate to test this relationship (or lack of relationship) between stress reported by a priori and empirical groups is the chi-square test for independence (see William L. Hays, Statistics, 1973, pp. 717-36). The a priori stress groups, coded low = 1, moderate = 2, and high = 3, were cross-tabulated with the responses to Question 22 (high stress = 1, some = 2, a little = 3, and none at all = 4). The responses to Question 22 were collapsed into three groups (a lot = high stress or 3, some and a little = moderate stress or 2, and none at all = low stress or 1) because of the small number of responses in some of the response categories.

The alpha level for significance of relationship was set at $p < .10$. This level was selected because this study tends to be of an exploratory, model-testing nature.

Multiple regression was used because it is a useful statistical technique for determining linear relationships between a set of predictor (independent) variables and a criterion (dependent) variable. The first predictor is entered into a linear prediction equation and evaluated as to its relationship to (predictability of) the criterion. Any linear relationship this predictor may have had with the criterion is then removed. The new criterion scores are termed residual scores, and new correlations are now calculated between the remaining predictors and the residual criterion scores. This same procedure is followed with each successive predictor variable. Some predictors may have a significant relationship with the criterion, others may not; if not, they are dropped from the equation.

In the a priori approach (looking at a priori stress groups), the difference in productivity from academic year 1979-80 to 1980-81 was the criterion variable. Stress, as measured by the department in which the faculty was a member, the social-support indicators, and the locked-in indicators were the predictors. Variables significantly related to productivity were to be the only variables remaining in the equation. As defined by the research model, stress was expected to be the strongest predictor variable, as measured by the sign and magnitude of its beta and by its R^2 change.

In the empirical approach (looking at empirical stress groups), the above procedure was replicated, except that stress was measured by the response to Question 22.

Regarding the research strategy, if the a priori groups did not report the stress level expected, then the research model (Figure 3.1) would still be tested using a priori defined stress, thus testing the "events" theory or the effect of stressful events per se on productivity. Next, the model would be tested using the empirical responses in order to look at the cognitive theory of stress, in other words the relationship between the individual's reaction to perceived stressors and his or her productivity. If either one of the theories is valid, then the regression analysis should show stress significantly related to productivity.

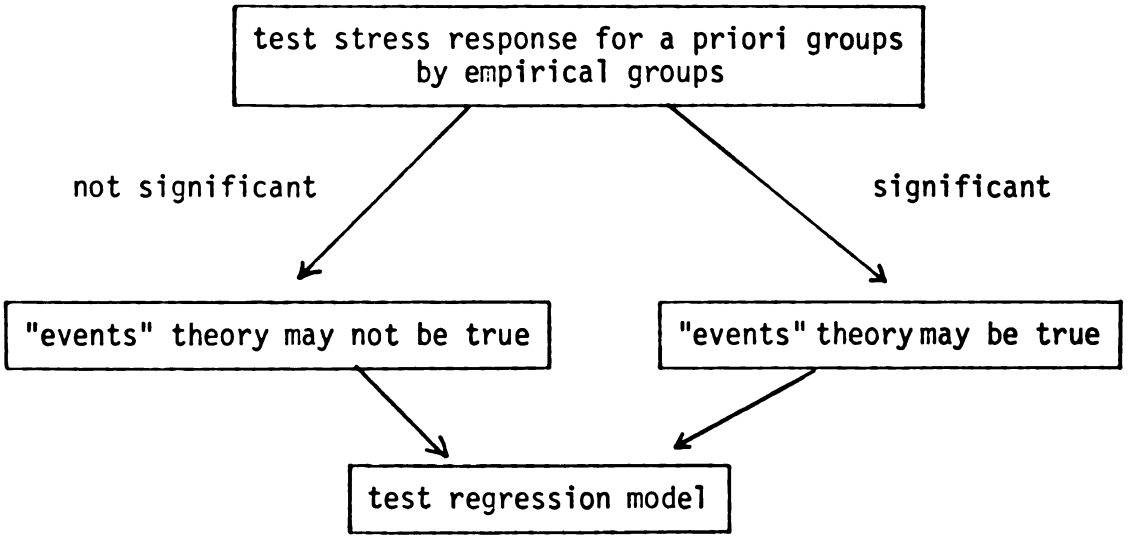

Figure 3.1.--Research model of the effects of social support and a feeling of being locked-in to a job on stress and strain, as they relate to productivity.

Because the regression analysis is exploratory and used for model testing, the alpha level has been set at $p < .10$ rather than the higher $p < .05$. The analysis strategy is depicted in the steps shown in Figure 3.1.

Data Analysis

Data from the questionnaire were integer coded and transferred to standard 80-column computer cards. The data were entered into the CDC 6000 and Cyber 70 version of SPSS (Statistical Package for the Social Sciences); the subprograms, FREQUENCIES, BREAKDOWN, CROSSTABS, and REGRESSION were used to analyze the data.

Hypotheses to Be Tested

Four hypotheses were tested in this study as follows:

Hypothesis I: Faculty in low-change departments will report experiencing little or no stress; faculty in moderate-change departments will report experiencing moderate stress; and faculty in high-change departments will report experiencing high stress.

Hypothesis II: There will be a negative relationship between reported amount of stress and productivity as measured by the difference between productivity in academic year 1980-81 and productivity in 1979-80.

Hypothesis III: There will be a negative relationship between reported level of feeling locked into a job and amount of productivity.

Hypothesis IV: There will be a positive relationship between reported social-support resources and amount of productivity.

CHAPTER IV

RESULTS

The purpose of this study was to look at the effects of stressful events on productivity; four hypotheses were tested, and the results of each are presented below.

> Hypothesis I: Faculty in low-change departments will report experiencing little or no stress; faculty in moderate-change departments will report experiencing moderate stress; and faculty in high-change departments will report experiencing high stress.

In Table 4.1, the empirical stress reports in the moderate- and low-stress categories were very small. Therefore, to meet the assumptions of the chi-square test, it was decided to combine the "some" and "a little" responses into one category called "moderate."

Table 4.1.--Contingency table of a priori stress groups with empirical groups.

A Priori Stress Groups	Empirical Stress Groups		
	High n	Moderate n	Low n
High	20	3	0
Moderate	24	13	7
Low	5	4	8

Chi-square (1) = .476, $p < .50$.

If the "events" theory of stress is true, then, when a contingency table is constructed comparing high-, moderate-, and low-change groups with high-, moderate-, and low-empirical-stress groups, the sum of the diagonal of the contingency table should be significantly greater than the total of the frequency in the off-diagonal cells. A chi-square test was used to determine if these frequencies were equal.

The results χ^2 (1) = .476, $p < .50$, were not significant; therefore, the on-diagonal and off-diagonal frequencies are equal and the hypothesis is not supported.

Hypotheses II, III, and IV were tested for each theory (events and cognitive) using one respective regression analysis.

Hypothesis II states that there will be a negative relationship between reported amount of stress and productivity, as measured by the difference between productivity in academic year 1980-81 and productivity in 1979-80.

Hypothesis III states that there will be a negative relationship between reported level of feeling locked into a job and amount of productivity.

Hypothesis IV states that there will be a positive relationship between reported social-support resources and amount of productivity.

The results for the "events" theory approach (using a priori defined stress) are shown in Table 4.2.

Table 4.2.--Results of regression analysis of a priori defined stress on productivity.

Variables in Equation	R	R^2	R^2 Change	Beta	F
Stress	.198	.039	.039	-.752	3.35*

*p < .07.

The only significant predictor of productivity change from academic year 1979-80 to 1980-81 was a priori defined stress. No other variables approached significance. (See Appendix F.) The beta (-.752) indicates that as stress increased (low stress = 1, moderate stress = 2, and high stress = 3), the degree of productivity from 1979-80 to 1980-81 decreased. The results support Hypothesis II but do not support Hypotheses III or IV.

The results for the "cognitive" theory approach (using empirically defined stress) are shown in Table 4.3. Three predictors were significantly related to productivity change: stress, locked-in Question 34 and social support Question 10.

Stress was negatively related (beta = 1.079) to productivity. Empirical stress was measured as high = 1, some stress = 2, a little stress = 3, and no stress at all = 4. A productivity increase from 1979-80 to 1980-81 was a positive value; a decrease a negative value.

Table 4.3.--Results of regression analysis of empirically defined stress on productivity.

Variables in Equation	R	R^2	R^2 Change	Beta	F
Stress	.246	.061	.061	1.079	5.29**
Locked-in Question 34	.326	.106	.045	-.745	4.12***
Social support Question 10	.371	.137	.031	-.747	2.90*

*p < .094.

**p < .011

***p < .024.

Question 34 stated, "Do you feel that the only position for which you are presently qualified is the job currently held?" The possible responses were 1 = definitely yes, 2 = yes, 3 = no, and 4 = definitely no. The beta (-.745) indicates the relationship between responses to Question 34 and productivity change to be negative; that is, the more locked into a job a faculty member reported, the more the increase in productivity from 1979-80 to 1980-81.

The social-support Question 10 states, "On the whole, how often do you maintain contact by mail or phone with an extended family member?" The responses were coded: 1 = at least once a week, 2 = at least once a month, 3 = at least once every six months, and 4 = at least once a year or more. The beta (-.747) indicates a negative relationship; that is, the more often the contact, the more the

increase in productivity from 1979-80 to 1980-81. These results support Hypothesis IV but not Hypothesis III.

CHAPTER V

DISCUSSION, SUMMARY, AND CONCLUSIONS

Discussion

In this chapter an interpretation of the research results is made, with each hypothesis being discussed consecutively.

As previously explained, for the purposes of this research, faculty were divided into three a priori change (or stress) groups--low, moderate, and high--depending on the amount of change and threat that their departments faced during the period of proposed reduction in force, i.e., academic year 1980-81. Hypothesis I predicted that faculty in low-change departments would report low experienced stress, that faculty in moderate-change departments would report moderate experienced stress, and that faculty in high-change departments would report high experienced stress. Thus, faculty in the a priori groups did not report experienced stress as predicted; the exception was the high-change a priori group: 87% of this faculty reported high stress.

There are several possible explanations for the finding that faculty in moderate- and low-change a priori groups reported more experienced stress than anticipated. First, the "events" theory of stress may not be true. The "events" theory concluded that experienced stress depends on the amount of change that an individual encounters in the environment. If that theory of stress were true, persons in low- and moderate-change a priori groups would not have

reported as much high stress as they did. Second, if the "events" theory of stress is not true, the alternative "cognitive" theory of stress might explain these unexpected findings. The "cognitive" theory concluded that it is the way a life event is interpreted by the individual rather than its inherent change or threat attributes that determines whether or not it is a stressor. Given this theory, it would appear that persons in the moderate- and low-change a priori groups interpreted the academic year 1980-81 as highly threatening, regardless of the amount of actual change or threat that their departments faced, and therefore experienced more stress than would have been expected given the "events" theory of stress. Third, Averill found in his experiments on control and stress that persons who had both behavioral and decisional control experienced higher stress than expected. Faculty in the low- and moderate-stress a priori groups may have been faced with a similar stressor. Presumably, they were relatively mobile; 53% of the low-change group thought they could move elsewhere, and 94% thought that they were qualified for other positions; 43% of the moderate-change a priori group thought that they could find a position elsewhere, and 84% of them thought they were qualified for other positions. Further, questionnaire results indicated that 41% of the low-change a priori group and 72.7% of the moderate-change a priori group thought about leaving MSU in academic year 1980-81.

Hypothesis II predicted that there would be a negative relationship between reported amount of stress and productivity as

measured by the difference between productivity in academic year 1980-81 and productivity in 1979-80.

The reasoning used to form this hypothesis was based on previous experiments that showed that the quality of an individual's performance varied with the amount of experienced stress, forming an inverted U-shaped curve. The performance of persons who experienced an excess of arousal or overload in response to environmental stressors deteriorated, while those who experienced an optimal amount of arousal performed best. The results of this research indicated that the hypothesis was as predicted and that, rather than an inverted U-shaped curve, there was a linear relationship between performance and the stressful environment.

In Chapter III, which outlined the research design, it was stated that either a priori change groups or empirical stress groups would be used to test Hypothesis II, depending on what theory of stress seemed true. This reasoning was based on two alternate theories of stress, which would be tested in Hypotheses I and II. As it turned out, the results from testing Hypothesis I supported the "cognitive" theory of stress, and the results from testing Hypothesis II supported both the "cognitive" and the "events" theories of stress. However, the "cognitive" approach appears to explain more of the findings in this study. Thus, this research indicates that neither theory alone is sufficient to account for the stress state and its effects on behavior. Further, it supports the idea of a linear rather than an inverted U-shaped relationship between performance and stress. Given the contradictory findings with regard to

which of the two stress theories was most appropriate for explaining the causes of a stress state and that there were at least two explanations verified by other experimenters for the unexpected findings in Hypothesis I regarding the reported experienced stress of the low- and moderate-change a priori groups, it was decided that both the a priori change groups and the empirical stress groups would be used to test Hypotheses III and IV.

Regarding Hypothesis III, the literature review reported the work of various researchers who have linked feelings of absence of control or helplessness with stress and diminished performance proficiency. A feeling of helplessness was measured by three questionnaire items--no opportunity to move from current job to another one at MSU, no opportunity to move from current job to one elsewhere, and only presently qualified for job currently held. The reason for equating locked-in feelings with helplessness was the notion that a person who felt locked-in could not take "flight" from the stressful environment; further, a person with limited options would be unwilling to "fight." Finally, an affirmative answer to any of the above questionnaire items implied that an individual had not adopted coping or defense mechanisms that would provide him or her with a sense of mastery over the stressful work situation.

The results relating to Hypothesis III indicate that a sense of absence of control is not directly related to a decrease in productivity. For the a priori stress groups, the only variable related to a decrease in productivity was stress itself. For the empirical groups, Question 34, which measured a perception of being qualified

for other positions than the one currently held, revealed that those who felt that they were qualified for many jobs decreased their productivity in 1980-81 as compared to 1979-80. Actually, this result means that when stress is removed as a variable from the regression equation, a sense of control may result in diminished productivity in a stressful environment. It does not answer the question of how a sense of control affects productivity for those faculty who experienced stress and felt that they were locked-in; i.e., it does not look at the moderating effects of a sense of control or lack of control when stress is reported as being experienced. Path analysis would be required to answer this question and is strongly recommended as the preferred technique for data analysis when looking at the moderating effects of both sense of control and social-support resources on experienced stress.

The results relating to Hypothesis IV indicate that social support did not relate significantly to a change in productivity for the a priori groups. It did have a direct relationship to increased productivity for the empirical groups; faculty who maintained closer ties with extended family had increased productivity. Again, this is only a measure of the direct relationship between social support and productivity when stress is removed from the regression equation. The moderating role on stress of social support would also require path analysis as a technique for analysis of the data.

In addition to the data gathered to test the above hypotheses, the questionnaire produced other information that shed light on the faculty's reaction to the events of 1980-81, as follows:

1. Three and six-tenths percent of the faculty sampled felt that the economic situation in Michigan as it impacts higher education in the next five years was going to get better; 55% felt that it was going to get worse; and 26% felt that it was going to stay the same.

2. Thirty-nine percent of the faculty sampled stated that, given the opportunity to choose again, they would definitely choose an academic career as their profession; 25% stated probably; and 7% stated that they would not choose an academic career as their profession.

3. Eight percent of the faculty sampled stated that they spent a lot of time in 1980-81 thinking about other employment opportunities inside the university; 13% spent some time; 24% spent a little time; and 39% spent no time.

4. Thirty-one percent of the faculty sampled stated that they spent a lot of time in 1980-81 thinking about employment opportunities outside the university; 27% spent some time; 13% spent a little time; and 13% spent none at all.

Further, when variables measuring social-support resources and feelings of being locked-in were examined as stress predictors, it was found that the perception of being unable to move from a current job to another one at MSU exacerbated stress for both empirical and a priori groups.

One question relating to social support was significantly related to increased stress for the a priori group, i.e., low amount

amount of assistance anticipated from colleagues in a crisis. Tables 5.1 and 5.2 illustrate this information.

Table 5.1.--Results of regression analysis of social-support and locked-in indicators on a priori stress.

Variables in Equation	R	R^2	R^2 Change	Beta	F
Locked-in Question 32	.368	.135	.135	-.298	11.436
Social support Question 20	.473	.224	.035	.224	2.893*

*p < .094.

**p < .001.

Table 5.2.--Results of regression analysis of locked-in and social-support indicators on empirical stress.

Variables in Equation	R	R^2	R^2 Change	Beta	F
Locked-in Question 32	.494	.244	.119	.271	7.528*

*p < .008.

Summary

Stress is a "state within a living creature" that results from the interaction of the organism with stressors, i.e., noxious stimuli or circumstances. Wolff distinguished between the actions of physiochemical disease agents and the actions of stressors or psychosocial factors. The former have direct pathogenic effects; the latter act indirectly because of their capacity to serve as signals or symbols that can increase the organism's susceptibility to direct noxious stimuli, i.e., physiochemical disease agents.

The stress state has physiological, emotional, and behavioral components. Physiologically, the stress state is characterized initially by arousal, which induces changes in the central and autonomic nervous systems and the endocrine system. These physical changes assist the organism in coping with the stressor. Emotionally, the stress state is initially characterized by feelings of either anxiety, or fear, or anger. These feelings are also functional; they motivate the individual to take action in the presence of a stressor. Behaviorally (from the standpoint of performance), the stress state is initially characterized by improvement or reduction in proficiency, depending on the intensity of the stressor. A stress state can become strain if it is prolonged because of the continued presence and noxious quality of the stressor. Strain is a change for the worse in an individual's physical, emotional, and behavioral functioning.

Two alternate theories have been proposed to explain the attributes of stress-inducing stimuli. One, a "change or events"

model, characterizes a stressor as new, intense, rapidly changing, and unexpected. In this model, stress results from change per se regardless of its desirability or undesirability. Following this model, Holmes and Rahe weighted recent life changes in terms of their stress-inducing potentiality. However, some researchers have found that only undesirable events are stress-inducing, and therefore, Paykel weighted the stress-inducing potentiality of recent life changes in terms of their reputed undesirability. The other theory, a "cognitive" model of stress, states that the stress-inducing potentiality of a stressor is contingent on how the individual perceives it. In this model, with the exception of objectively life-threatening situations, no stimulus is a stressor to all individuals exposed to it. Individual vulnerability depends on differences in personal experience, coping skills, personality, and physiological dispositions.

Lately, research on stress has focused on environmental factors that may buffer or exacerbate the stress-inducing potentiality of psychosocial stressors. Two factors have been identified as particularly important in epidemiological studies of the differential effects of stressors on individuals. These are the perception of individual control over the environment and the presence of social support. Feelings of helplessness appear related to strain, as is the absence of social support.

Although opinions differ about what makes events stressful, each of the following attributes has been treated by at least three researchers as the critical dimension of stressful life events:

change in the life pattern or activities of the individual, undesirability (a subjective perception of the event as threatening), unpredictability, and absence of control over the outcome. Given the above conception of the attributes of stress-inducing stimuli, it is apparent that faculty at Michigan State University experienced unprecedented work-related stress in the academic year 1980-81. The stressor was the Board of Trustee's announcement that approximately 100 tenured and tenure-stream faculty were going to be laid off because of financial crisis.

Holmes and Rahe and Paykel ranked the loss of a job as eighth among approximately 40 life situations that produce stress. This study was designed to measure the consequences of a proposed reduction in force on faculty productivity. For the purposes of this research, faculty productivity was defined as journal articles (refereed and nonrefereed) completed and submitted for publication in academic year 1980-81, books completed in academic year 1980-81, and research proposals submitted in academic year 1980-81.

Previous experimental research found a negative relationship between high and low arousal and performance proficiency, appearing in the form of an inverted U-shaped curve. Because the level of arousal in response to the stressor at the university was assumed to vary among departments depending on the amount of change and threat faced, faculty surveyed were divided among low-, moderate-, and high-change groups. The research was designed to examine whether or not faculty output was affected by a stressful work environment and whether or not productivity differences reflected the differences in

objective stressors encountered by faculty. Further, research has shown that environmental stressors can be moderated by available social-support resources and that feelings of helplessness exacerbate stressors. Therefore, the amount of social support available to faculty was measured in the questionnaire in terms of depth and breadth of social involvement and the individual's perception of the amount of expected assistance in a crisis. Feelings of helplessness were measured by questions that indicated a feeling of being locked-in to the job. It was supposed that an individual who felt locked-in could not take "flight" from the stressor and that a perceived absence of options would make "fight" an unviable choice of response to the stressor. Finally, it was supposed that an affirmative answer to any of the locked-in questions indicated that the individual had not adopted either coping or defense mechanisms that would protect him or her against the feeling of helplessness.

The hypothesis examined was that there is a negative relationship between faculty productivity and stressors in the work environment of the magnitude of the threat of job loss. Consequently, it was predicted that faculty productivity declined in academic year 1980-81 as compared with 1979-80. In addition, it was predicted that this stressor would have a differential effect, depending on the amount of objective change faced by faculty, on the amount of control over the stressor perceived by faculty, and on the amount of social support at the disposal of faculty. A questionnaire was distributed in October to gather data to test these hypotheses.

Conclusions

The results of this research indicate the following:

1. Stress has an adverse effect on productivity; as stress increases, productivity decreases. Further, the relationship between stress and productivity is linear rather than following the pattern of the inverted U-shaped function found in experimental studies of the effects of arousal on performance.

2. Neither the "events" approach nor the "cognitive" approach. is sufficient alone to explain the effects of stress on productivity. This study indicates that both the individual and the situation must be considered when looking at stress effects.

3. Social support may have a direct relationship to increased productivity.

4. A sense of control may be directly related to diminished productivity.

5. The results for both social support and sense of control only relate to the direct effect of these variables on productivity; their indirect or moderating effects, in the presence of stress, require the use of path analysis as an analytic technique.

Implications for Future Research

This was an exploratory study of the effects of stressors in the workplace on faculty productivity. The results indicate that a proposed reduction in force does contribute to a decrease in productivity. The duration of this effect ideally should be measured in a five-year longitudinal study because, like trauma, some of the

negative effects of stress do not show up until several years after the stressful event. For example, a five-year study beginning in 1980 might show a decline in faculty productivity of books and research proposals over the long term, whereas a two-year study may be insufficient to reveal the true effects of stress of this type of output.

To look at moderators of stress, a questionnaire constructed in a future study could develop several measures of stress to be probed and thereby would be able to use path analysis as a research tool.

The significant relationship between feelings of being locked-in and stress suggests that additional research needs to be done on ways to involve faculty meaningfully in administrative decisions about reduction in force. It also underscores the stress-reducing potential of planned social services to faculty facing layoffs and suggests directions that these services should take, i.e., retraining and assistance in relocation. These efforts should decrease the sense of helplessness associated with job loss--a scenario that undoubtedly will reoccur given demographic changes and financial constraints on the allocation of resources to higher education.

APPENDICES

APPENDIX A

SOCIAL READJUSTMENT RATING SCALE

Social Readjustment Rating Scale

Rank	Life Event	Mean Value
1	Death of spouse	100
2	Divorce	73
3	Marital separation	65
4	Jail term	63
5	Death of close family member	63
6	Personal injury or illness	53
7	Marriage	50
8	Fired at work	47
9	Marital reconciliation	45
10	Retirement	45
11	Change in health of family member	44
12	Pregnancy	40
13	Sex difficulties	39
14	Gain of new family member	39
15	Business readjustment	39
16	Change in financial state	38
17	Death of close friend	37
18	Change to different line of work	36
19	Change in number of arguments with spouse	35
20	Mortgage over $10,000	31
21	Foreclosure of mortgage or loan	30
22	Change in responsibilities at work	29
23	Son or daughter leaving home	29
24	Trouble with in-laws	29
25	Outstanding personal achievement	28
26	Wife begin or stop work	26
27	Begin or end school	26
28	Change in living conditions	25
29	Revision of personal habits	24
30	Trouble with boss	23
31	Change in work hours or conditions	20
32	Change in residence	20
33	Change in schools	20
34	Change in recreation	19
35	Change in church activities	19
36	Change in social activities	18
37	Mortgage or loan less than $10,000	17
38	Change in sleeping habits	16
39	Change in number of family get-togethers	15
40	Change in eating habits	15
41	Vacation	13
42	Christmas	12
43	Minor violations of the law	11

APPENDIX B

SCALING SCORES FOR LIFE EVENTS

Scaling Scores for Life Events

Rank	Event	Mean	SD
1	Death of child	19.33	2.22
2	Death of spouse	18.76	3.21
3	Jail sentence	17.60	3.56
4	Death of close family member (parent, sibling)	17.21	3.69
5	Spouse unfaithful	16.78	4.14
6	Major financial difficulties (very heavy debt, bankruptcy)	16.57	3.83
7	Business failure	16.46	3.71
8	Fired	16.45	4.20
9	Miscarriage or stillbirth	16.34	4.59
10	Divorce	16.18	4.95
11	Marital separation due to argument	15.93	4.55
12	Court appearance for serious legal violation	15.79	4.26
13	Unwanted pregnancy	15.57	5.18
14	Hospitalization of family member (serious illness)	15.30	4.15
15	Unemployed for one month	15.26	4.38
16	Death of close friend	15.18	4.55
17	Demotion	15.05	4.57
18	Major personal physical illness (hospitalization of one month off work)	14.61	4.44
19	Begin extramarital affair	14.09	5.40
20	Loss of personally valuable object	14.07	4.90
21	Law suit	13.78	5.02
22	Academic failure (important exam or course)	13.52	5.07
23	Child married against respondent's wishes	13.24	5.36
24	Break engagement	13.23	5.31
25	Increased arguments with spouse	13.02	4.91
26	Increased arguments with resident family member	12.83	5.15
27	Increased arguments with fiance or steady date	12.66	4.96
28	Take a large loan (more than one-half of a year's earnings)	12.64	5.43
29	Son drafted	12.32	5.75
30	Arguments with boss or co-worker	12.21	5.06
31	Argument with nonresident family member (in-laws, relatives)	12.11	5.09
32	Move to another country	11.37	6.05

APPENDIX C

QUESTIONNAIRE AND COVER LETTER

FOR EACH OF THE ITEMS IN THE QUESTIONNAIRE, PLEASE MAKE A CHECK MARK FOR THE APPROPRIATE RESPONSE. IF YOU HAVE ADDITIONAL COMMENTS, SPACE IS PROVIDED AT THE CONCLUSION OF THE QUESTIONNAIRE. IF QUESTION DOES NOT APPLY, PLEASE LEAVE BLANK.

1. Have you experienced any of the following events in the last two years?

Death of a spouse	____Yes	____No
Divorce	____Yes	____No
Marital separation	____Yes	____No
Jail term	____Yes	____No
Death of a close family member	____Yes	____No
Personal injury or serious illness	____Yes	____No
Illness/injury to family member	____Yes	____No
Marriage	____Yes	____No

2. What is your age?

____25 - 35
____36 - 45
____46 - 55
____56 - 65
____66 or older

3. Are you married? ____Yes ____No

3. a. If yes, is your spouse employed full time? ____Yes ____No

3. b. Is your spouse employed part-time? ____Yes ____No

4. Do you have children? ____Yes ____No

4. a. How many of them do you have?

____1 ____2 ____3 ____4 ____5 ____6 or more

4. b. If yes, are they living with you? ____Yes ____No

4. c. Into what age groups do your children fall?

____0 - 5
____6 - 10
____11 - 17
____18 - 21
____22 - 30

5. Are you a member of a church, synagogue, or other formal religious group?

____Yes ____No

5. a. If yes, how would you describe the extent of your participation in activities connected with your church, synagogue or other religious group?

____a lot ____some ____a little ____none at all

6. Are you a member of a neighborhood association? ____Yes ____No

6. a. If yes, how would you describe the extent of your participation in activities connected with such an association?

____a lot ____some ____a little ____none at all

7. Are you a member of a professional group or groups? ____Yes ____No

7. a. If yes, how would you describe the extent of your participation in activities connected with such group or groups?

____a lot ____some ____a little ____none at all

8. On the whole, how satisfied are you with your neighborhood?

____very satisfied
____somewhat satisfied
____somewhat dissatisfied
____very dissatisfied

9. On the whole, how satisfied are you with living in your community?

____very satisfied
____somewhat satisfied
____somewhat dissatisfied
____very dissatisfied

10. On the whole, how often do you maintain contact by mail or phone with an extended family member (family members other than spouse and children who are related by blood or marriage)?

____at least once a week
____at least once a month
____at lease once every six months
____once a year or more

11. How often do you see extended family members?

____at least once a week
____at least once a month
____at least once every six months
____once a year or more

12. How often do you spend time with extended family members?

____at least once a week
____at least once a month
____at least once every six months
____once a year or more

13. Would you describe the amount of time that you spend with immediate family members [spouse (if married) and offspring (if any)]?

____a lot ____some ____a little ____not at all

14. On the whole, how often do you maintain contact with friends by mail or phone?

____at least once a week
____at least once every two weeks
____at least once every three weeks
____at least once a month

15. On the whole, how often do you see friends in an informal setting (example, not at work)?

____at least once a week
____at least once every two weeks
____at lease once every three weeks
____at least once a month

16. How would you describe the amount of time that you spend with your friends in an informal setting?

____a lot ____some ____a little ____none at all

17. In a crisis, how much do you feel you can rely on your immediate family to assist you?

____a lot ____some ____a little ____none at all

18. In a crisis, how much do you feel you can rely on your extended family to assist you?

____a lot ____some ____a little ____none at all

19. In a crisis, how much do you feel you can rely on friends to assist you?

____a lot ____some ____a little ____none at all

20. In a crisis, what kind of assistance would you expect to receive from the colleques in your department?

____a lot ____some ____a little ____none at all

21. If employed, to what extent did your spouse feel his or her job was in jeopardy in 1980-1981?

____a lot ____some ____a little ____none at all

22. Did you find the work situation at MSU in 1980-1981 stressful? By stressful, I mean a work environment characterized as intense, rapidly changing, with sudden or unexpected events approaching the upper thresholds of tolerability.

____a lot ____some ____a little ____none at all

23. Did you experience strain in response to this stress? By strain, I mean one's reactions to stress: behavioral, or physiological, or emotional.

____a lot ____some ____a little ____none at all

AS STATED IN THE COVER LETTER, THIS RESEARCH IS LOOKING AT THE RELATIONSHIP BETWEEN ENVIRONMENTAL STRESS AND PRODUCTIVITY, AS MEASURED BY OUTPUT IN THE FORM OF JOURNAL ARTICLES, BOOKS COMPLETED; PAPERS PRESENTED AND RESEARCH PROPOSALS SUBMITTED; ALTHOUGH, OF COURSE, THERE ARE OTHER MEASURES OF ACADEMIC PRODUCTIVITY. THE FOLLOWING QUESTIONS RELATE TO OUTPUT IN ACADEMIC YEARS (FALL - SUMMER) 1979-1980 AND 1980-1981.

24. How many articles did you complete in academic year 1979-1980 that were submitted to journals for publication in 1979-1980?

    ___1 ___2 ___3 ___4 ___5 ___6 or more

25. How many articles did you complete in academic year 1980-1981 that were submitted to journals for publication in 1980-1981?

    ___1 ___2 ___3 ___4 ___5 ___6 or more

26. How many articles completed in 1979-1980 were submitted to refereed or juried journals?

    ___1 ___2 ___3 ___4 ___5 ___6 or more

27. How many articles completed in 1980-1981 were submitted to refereed or juried journals?

    ___1 ___2 ___3 ___4 ___5 ___6 or more

28. Did you complete a book in 1979-1980? ___Yes ___No

29. Did you complete a book in 1980-1981? ___Yes ___No

30. How many research proposals did you submit in academic year 1979-1980?

    ___1 ___2 ___3 ___4 ___5 ___6 or more

31. How many research proposals did you submit in academic year 1980-1981?

    ___1 ___2 ___3 ___4 ___5 ___6 or more

32. Do you feel that there is almost no opportunity to move from your current job to another one at MSU?

    ___definitely Yes ___Yes ___definitely No ___No

33. Do you feel that there is almost no opportunity to move from your current job to another one elsewhere?

    ___definitely Yes ___Yes ___definitely No ___No

34. Do you feel that the only position for which you are presently qualified is the job currently held?

    ___definitely Yes ___Yes ___definitely No ___No

35. Do you feel that the economic situation in Michigan as it impacts higher education in the next 5 years is going to:

    ___improve
    ___get worse
    ___stay pretty much the same

36. If you had it to do all over again, would you still choose an academic career as your profession?

    ___definitely Yes ___Probably ___Maybe ___No

37. Did you spend time in 1979-1980 thinking about other employment opportunities inside the university?

    ___a lot ___some ___a little ___none at all

38. Did you spend time in 1979-1980 thinking about other employment opportunities outside the university?

    ___a lot ___some ___a little ___none at all

39. Did you spend time in 1980-1981 thinking about other employment opportunities inside the university?

    ___a lot ___some ___a little ___none at all

40. Did you spend time in 1980-1981 thinking about other employment opportunities outside the university?

    ___a lot ___some ___a little ___none at all

August 20, 1981

Dear Michigan State University Faculty:

During the past year, Michigan State University faculty have experienced what might be characterized as unprecedented stress in the work environment: the traditional notion of the tenure system has been challenged; departments have been faced with layoffs or dissolution; rumors and misinformation have been rampant.

Some theorists believe that environmental stimulation is positively related to productivity; others believe that one must distinguish among the amount and kinds of stimulation when looking at productivity.

My purpose is to compare faculty productivity in 1980-81 with faculty productivity in 1979-80. While many measures of productivity in higher education can be used, for the purposes of this research, productivity will be confined to publications, research proposals, and presented papers.

My long-range interest is looking at the effects of stress in the work environment, identifying possible stress mediators, and recommending intervention techniques that may mitigate stress.

In the interests of stress research and higher education, which promises to become an increasingly stressful work environment in the years to come, I would greatly appreciate your completing this questionnaire. All questionnaire information will be confidential with regard to source.

This questionnaire has been piloted on 10 persons and takes approximately 10 minutes to complete. Please complete the questionnaire within five days of receipt and return it in the addressed and stamped envelope provided.

I thank you in advance for your cooperation and help.

Carol David, Ph.D. Candidate
Department of Administration
and Higher Education
MICHIGAN STATE UNIVERSITY

Tel: 373-8171 (8am-5pm, Th. & Fr.)
351-6054 (7pm-10pm)

APPENDIX D

SAMPLING PROCEDURE

Initially, questionnaires were mailed to the following faculty in low-change (stress) departments:

16 faculty in Accounting and Financial Administration
15 faculty in Agricultural Economics
10 faculty in Communications
18 faculty in Electrical Engineering and Systems Science

Questionnaires were mailed to the following faculty in moderate-change (stress) departments:

42 faculty in American Thought and Language
43 faculty in Education
12 faculty in Natural Science
13 faculty in Human Environment and Design
9 faculty in History

Questionnaires were mailed to the following faculty in high-change (stress) departments:

37 faculty in Nursing
14 faculty in Social Work
5 faculty in Astrophysics
3 faculty in Urban and Metropolitan Studies
5 faculty in Racial and Ethnic Studies

The final sample used for data analysis was as follows:

Low-stress departments included Business (1), Agricultural Economics (5), Communications (4), and Engineering (7).

Moderate-stress departments included American Thought and Language (20), Education (13), Natural Science (5), History (3), and Human Environment and Design (4).

High-stress departments included Astrophysics (2), Social Work (4), Nursing (13), Urban and Metropolitan Studies (2), and Racial and Ethnic Studies (1).

APPENDIX E

CORRELATION MATRIX OF PRODUCTIVITY VARIABLES

Correlation Matrix of Productivity Variables

	JART 79-80	RJART 79-80	BOOK 79-80	RESPR 79-80	SUM 79-80	JART 80-81	RJART 80-81	BOOK 80-81	RESPR 80-81	SUM 80-81	TOTAL SUM
JART 79-80	1.00	.82	.25	.51	.92	.67	.57	.17	.52	.68	.86
RJART 79-80		1.00	.24	.49	.91	.54	.68	.20	.49	.66	.84
BOOK 79-80			1.00	.19	.35	.32	.25	.25	.08	.28	.34
RESPR 79-80				1.00	.73	.39	.32	.01	.71	.51	.67
SUM 79-80					1.00	.64	.62	.18	.64	.73	.93
JART 80-81						1.00	.85	.28	.52	.94	.85
RJART 80-81							1.00	.31	.42	.91	.82
BOOK 80-81								1.00	.02	.35	.28
RESPR 80-81									1.00	.69	.72
SUM 80-81										1.00	.93
TOTAL SUM											1.00

APPENDIX F

FACULTY PRODUCTIVITY FROM 1979-80 TO 1980-81 BY DEPARTMENT, A PRIORI STRESS LEVEL, AND EMPIRICAL STRESS LEVEL

Productivity of Departments From 1979-80 to 1980-81

Department	Mean	SD	N
Business	0	0	1
Communications	1.2910	-.5000	4
Agricultural Economics	1.8166	1.6000	5
Engineering	2.3401	.8571	7
Natural Science	2.4495	0	4
Education	5.0055	.6364	13
American Thought and Language	2.4608	-1.0556	19
Human Environment and Design	1.7321	-.5000	4
History	0	.0033	3
Astrophysics	1.7078	-.2500	4
Social Work	4.3970	0	4
Nursing	1.7246	-1.1538	13
Urban and Metropolitan Studies	.7071	-.5000	2
Racial Studies	0	-5.0000	1

Productivity of Faculty by A Priori Stress Level From 1979-80 to 1980-81

Stress Level	Mean	SD	N
Low	.4545	1.8186	22
Moderate	-.3659	3.1997	41
High	-1.0476	2.3974	21

Productivity of Faculty by Empirical Stress Level From 1979-80 to 1980-81

Stress Level	Mean	SD	N
A lot of stress	-.9388	2.4359	49
Some stress	.6000	3.4090	20
A little stress	.1667	1.7495	12
None at all	1.6667	3.7859	3

APPENDIX G

CORRELATION COEFFICIENTS OF QUESTIONNAIRE VARIABLES 5-34 WITH REPORTED PRODUCTIVITY

	PRODUCTY	STRESSLV	EXTENCH	EXTENNE	EXTENGR	QUEST8	QUEST9	QUEST10	QUEST11	QUEST12
STRESSLV	-.19825									
EXTENCH	-.01903	-.06255								
EXTENNE	.07558	.06125	.21991							
EXTENGR	.13746	.01931	.13563	.06643						
QUEST8	-.00068	.03444	.02472	.05791	.00661					
QUEST9	-.02888	.17177	-.02390	.06460	-.07871	.64967				
QUEST10	-.13464	-.06059	-.02116	-.02963	.03067	-.06165	-.03945			
QUEST11	-.06656	-.09758	.12210	-.08748	.12575	-.01016	.09648	.58569		
QUEST12	-.01582	-.07952	.09063	-.06922	.11701	.07050	.14876	.56682	.90787	
QUEST13	-.01582	.07009	-.06365	.08766	-.23589	.16572	.37575	.05923	.08145	.07684
QUEST14	-.02403	-.21428	-.00480	-.10504	-.01925	-.14756	-.32419	.13055	.24185	.24314
QUEST15	.09241	-.13241	-.03730	-.06890	.06150	.08251	-.05221	-.01713	.16994	.11653
QUEST16	-.01114	-.17350	.03077	.01175	.10909	-.05434	-.18856	.09845	.23002	.20304
QUEST17	.00664	.13786	-.07637	.05302	-.08358	.18356	.41919	.06458	.08803	.10319
QUEST18	-.08424	.03313	-.09785	-.00983	.11367	.33335	.32907	.14349	.13466	.23505
QUEST19	-.09613	.01819	.02809	-.03219	.17851	.22958	.04589	-.09681	.04069	.08272
QUEST20	-.07265	.20268	-.12506	.05754	.21769	.33396	.27235	-.10842	.00298	.06685
QUEST32	.20303	-.36795	.18364	.04763	.05562	.08055	-.06379	.00197	.10924	.08374
QUEST33	.11674	-.12017	-.05407	-.18099	-.02308	-.11166	-.22022	.05001	.05795	.04999
QUEST34	-.13174	-.07472	-.12728	-.09073	-.16648	-.10992	-.12263	.04672	-.01678	.02792

	QUEST13	QUEST14	QUEST15	QUEST16	QUEST17	QUEST18	QUEST19	QUEST20	QUEST32	QUEST33
QUEST14	-.22456									
QUEST15	-.13292	.64011								
QUEST16	-.17407	.54574	.68747							
QUEST17	.79629	-.13387	-.10374	-.15296						
QUEST18	.12135	-.02837	-.08032	-.06633	.27812					
QUEST19	-.09705	.28152	.45497	.50894	.04095	.21205				
QUEST20	-.02150	.08665	.20151	.16350	.11600	.17900	.46830			
QUEST32	-.09692	-.08829	-.12167	-.10734	-.20459	-.11191	-.15668	-.09162		
QUEST33	-.27435	.14062	-.01719	-.00248	-.35166	-.06490	-.17276	-.14649	.29567	
QUEST34	-.26596	.19723	.07449	.06326	-.27272	-.13527	-.08598	-.25466	.13189	.39830

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